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LITANI RIVER BASIN MANAGEMENT SUPPORT PROGRAM

KNOWLEDGE ASSESSMENT SURVEY
JULY 2012

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This report was produced for review by the United States Agency for International Development (USAID). It was prepared by International Resources Group (IRG) under Contract EPP-I-00-04-00024-00 order no 7.

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ACRONYMS

GOL	Government of Lebanon
Ii	Information International
IRG	International Resources Group
IQC	Indefinite Quantity Contract (a contracting mechanism for USAID)
LRA	Litani River Authority
LRBMS	Litani River Basin Management Support Program
MOEW	Ministry of Energy and Water
USAID	United States Agency for International Development

FOREWORD

This Knowledge Assessment Survey for the year 2012 was carried out by Information International sal, a research consultancy firm based in Beirut, Lebanon, under subcontract with International Resources Group (IRG), the main contractor under the Litani River Basin Management Support (LRBMS) Program, a USAID- funded program in Lebanon (Contract EPP-I-00-04-00024-00 Task Order No.7) under the Integrated Water and Coastal Resources Management Indefinite Quantity Contract (IQC) II.

EXECUTIVE SUMMARY

PROGRAM BACKGROUND

The LRMBS Program is a four-year program to improve water management in the Litani River Basin in the Bekaa. It is undertaken by IRG, in cooperation with LRA, and is funded by USAID. The program began in October 2009 and has four components: Building institutional capacity, Water monitoring, Irrigation management and Risk management.

BACKGROUND

The LRMBS Program is a four-year program to improve water management in the Litani River Basin in the Bekaa. It is undertaken by IRG, in cooperation with LRA, and is funded by USAID. The program began in September 2009 and has four components: Building institutional capacity, Water monitoring, Irrigation management and Risk management.

In order to help support the activities of the "Institutional Capacity Building" component of the LRBMS Program, IRG contracted Information International to carry out a quantitative opinion survey to assess the level of recognition of a recent LRBMS-sponsored water awareness campaign, as well as the level of knowledge of residents regarding water issues in the Litani River Basin.

PURPOSE AND METHODOLOGY

Apart from assessing the impact of the recent billboard campaign, four main research questions were identified for this survey:

- Level of awareness of residents regarding water-related problems affecting the upper Litani River Basin.
- Public perception of water-pollution sources/causes (residential pollution, industrial pollution, agricultural pollution and solid wastes) and water wasting practices (over-irrigation, overuse by industries, etc.).
- Interest/willingness to be engaged in solving water-related issues.
- Public perception of the current and desired involvement of various entities in solving water issues.

A short and focused questionnaire was developed to address these research themes, with most of the 20 questions being close-ended. The collection of information for the full scope of the study was achieved through a quantitative survey with a sample of 700 respondents, aged 21 years old and above, residents of the Litani River Basin area, in the cazas of West Bekaa, Zahle and Baalbeck.

24 towns and villages were first selected in order to properly cover the entire area. The total number of questionnaires administered in each caza was then proportionally distributed between the selected villages, based on their population weight.

The field work was conducted between May 28, 2012 and June 9, 2012.

MAIN SURVEY FINDINGS

Recognition of the billboard campaign (five different posters presenting the different types of water pollutions): The posters were in general received positively by 82% of those who saw them, but their actual visibility was only 22%. The message conveyed was understood (main message being about everyone's responsibility) and was the main reason (74%) why people liked the posters. Similarly 88% of those who saw the posters agreed with the message, and 39% acknowledged a change in their water use practices as a direct result.

Water knowledge: Most residents know that water is mostly used volume-wise for domestic (85%) and irrigation (75%) purposes, while industry (15%) and energy (2%) are rarely mentioned. The main problems faced by the residents are first pollution (56%), second general water scarcity (33%) and delivery shortages(27%), and third water wastages (22%). Causes were focusing on sewage systems (43%) and network issues (25%) but the lack of proper management (monitoring, operation and maintenance) was also mentioned (28%). Interestingly, while 88% consider surface waters generally polluted (very polluted say 67%), only 22% say so about groundwater. In both cases, sources of pollution are in the same order: domestic sewage, then industrial waste, then solid waste and finally agriculture..

Willingness of respondents to engage in solving water issues: over 60% of respondents agree that their actions can mitigate water pollution and water wastages. They likewise agree that users (residents, industries, farmers) should directly pay for water supply, and somewhat for residential

wastewater treatment (half favor users paying and half favor central government covering these costs from general taxes).

Public perceptions of desired roles in water management: Respondents tend to favor Municipalities and then the Ministry of Energy and Water as the main providers of water services, the Bekaa Water Establishment is somewhat mentioned, while the Litani River Authority is largely unknown.

Water Management Function ---------- Agency	Provide potable water	Provide irrigation water	Treat wastewater	Measure water	Control withdrawals	Informs about water
Municipality	36%	40%	63%	28%	25%	46%
Ministry	23%	11%	10%	36%	45%	20%
RWE	22%	4%	1%	10%	7%	2%
LRA	1%	13%	1%	3%	1%	0%

CONCLUSIONS AND RECOMMENDATIONS

Based on the above, the following conclusions and recommendations are drawn:

- The billboard awareness campaign achieved a decent recognition (such campaigns usually reach 20-50% of residents), especially here in Lebanon given the high density/crowding of billboards along major highways. The same messages should however be advertised using other medias (most respondents favor TV documentaries as a 'very effective' way of conveying messages to the public). Municipality meetings were also mentioned by 50% of respondents. Follow-up activities should be defined accordingly.
- The high percentages of people who strongly agree with the fact that their actions can make a difference in reducing water pollution and wastage is an indicator of the readiness of the people to take action towards this end. This also suggests that awareness campaigns, if conducted properly, will be capable of influencing the attitudes of the residents. Likewise a majority of residents agree that water users and water polluters should be directly responsible for the associated costs of delivering water or treating the effluents. This should be seen as political support for setting up the relevant water fee mechanisms.
- There are rather high expectations regarding the role of Municipalities in water management, with many respondents wishing that Municipalities would do more than they do now. Building the capacity and leadership of Municipalities for water management should be considered a priority.

1. INTRODUCTION

1.1. AUTHORIZATION

International Resources Group (IRG) was contracted by USAID/Lebanon (Contract EPP-I-00-04-00024-00 Task Order No. 7) under the Integrated Water and Coastal Resources Management Indefinite Quantity Contract (IQC) II to implement the Litani River Basin Management Support (LRBMS) Program. The period for performance of the contract is September 29, 2009 to September 30, 2012.

1.2. PROGRAM OBJECTIVES

The purpose of the LRBMS Program is to set the ground for improved, more efficient and sustainable basin management at the Litani river basin through provision of technical support to the Litani River Authority and implementation of limited small scale infrastructure activities.

The LRBMS program is part of USAID's increasing support for the water sector in Lebanon. The Litani River Basin suffers the fate of many river basins around the world: increasing demands compete for limited natural resources. Groundwater over-exploitation, deforestation and overgrazing, unplanned urban sprawl, untreated wastewater effluents, and unsustainable agricultural practices contribute to environmental degradation in the form of declining water and soil quality.

Solutions do exist to reverse these trends and establish sustainable management practices. The key to successfully implement such solutions requires applying the principles of Integrated Water Resources Management (IWRM) through a single river basin authority rather than multiple agencies responsible for different aspects of water management as is the case in many countries. Fortunately, the existence of the Litani River Authority (LRA) provides a unique platform to become such an IWRM river basin authority that will mobilize stakeholders in the river basin and address these challenges in an integrated manner.

Successful implementation of LRBMS will prepare the LRA to assume the role of an integrated river basin authority upon the removal of the present legal constraints.

1.3. PROGRAM COMPONENTS

To achieve the LRBMS program objectives, the Contractor shall undertake tasks grouped under the following four components:

i. Building Capacity of LRA towards Integrated River Basin Management

ii. Long Term Water Monitoring of the Litani River

iii. Integrated Irrigation Management which will be implemented under two sub-components:

   a. Participatory Agriculture Extension Program: implemented under a Pilot Area: West Bekaa Irrigation Management Project

   b. Machghara Plain Irrigation Plan

iv. Risk Management which will be implemented under two sub-components:

   c. Qaraoun Dam Monitoring System

d. Litani River Flood Management Model

1.4. PURPOSE OF THE REPORT

This report presents the results of the opinion survey conducted by Information International sal (a research consultancy firm), upon the request of IRG as part of the implementation of the LRBMS program.

The survey looks mainly into assessing the level of awareness on water issues among the residents of the Litani River Basin.

1.5. CONTENT OF THE REPORT

The remainder of the report is divided into four chapters:

- Chapter 2 describes the questionnaire development process
- Chapter 3 describes the objectives of the survey, the methodology used as well as the problems faced.
- Chapter 4 presents the survey results.
- Chapter 5 includes the final questionnaire adopted for the survey as Annex.

2. SURVEY QUESTIONNAIRE

Three main research questions are identified for the purpose of this survey:

- Assess level of awareness of water-related problems affecting the residents of the Litani River Basin area in the themes of water quality / pollution and water quantity.
- Identify and prioritize public perception of water-pollution sources/causes (residential pollution, industrial pollution, agricultural pollution and solid wastes) and water wasting practices (over-irrigation, overuse by industries, etc.).
- Assess interest/willingness to be engaged in solving water-related issues.

A focused questionnaire was developed to address these research themes (Refer to Appendix A). The draft questionnaire was discussed with IRG team and modifications were implemented to address comprehensively the research objectives. Mainly, a section addressing the impact of the billboards campaign undertaken by IRG was added at the beginning the questionnaire, a new section related to public perception of water management issues was also added around the end of the questionnaire, in addition to few questions addressing more specifically the general survey themes.

Each research theme was addressed through several questions as detailed in the below table:

Table 2.1: Research Themes and Questions

Research question	Question number	Analysis/justification (how will we use results?)
1) Level of awareness of water-related problems	1	Assessment of awareness regarding water needs and their relative importance
	10	Prioritization of water problems
	11	Awareness of pollution of Surface waters
	12	Degree of pollution of Surface waters
	14	Awareness of pollution of Ground water
	15	Degree of pollution of Ground water
2) Public perception of water-pollution sources/causes	10	Causes of water problems
	13	Causes of Surface waters pollution
	16	Causes of Ground water pollution
	17	Respondents behavior as it relates to causes of water pollution
3) Interest/willingness to be engaged in solving water-related issues.	18	Own actions' effect on reducing pollution and water wastage
	20	Responsibility of payment for water supply and water related problems
4) Poster Impact	2	Awareness of posters, were they noticed?
	3	Appreciation of posters, were they appreciated/liked?
	4	Understanding of posters, is the message clear?
	5	Agree/disagree with message conveyed through posters
	6	Impact of posters on feelings of respondents, if any
	7	Impact of posters, are people reacting to the message?
	8	Impact of posters, how are they reacting?
	9	Effectiveness of various methods in conveying messages to the public
5) Public perception of water management issues	19	Responsibility of various water management issues

A final version of the questionnaire was then sent to IRG for final approval. The approved English version was translated to Arabic and then approved by IRG before starting the field work.

3. SURVEY AREA AND PRINCIPLES

3.1. SURVEY AREA

The survey was conducted with 700 respondents residing in 24 towns/villages in the cazas of Baalbeck, Zahle and West Bekaa, located in the upper, middle and lower stream of the Litani River.

Figure 3.1: Map Showing Upper Litani River Basin Municipalities

3.2. SURVEY APPROACH

The collection of information for the full scope of the study was achieved through conducting a quantitative survey with a sample of 700 respondents, as per Client request, aged 21 years old and above, residents of the Litani River Basin area.

Information International developed a list of major Litani River Basin villages (around 70 villages), located mainly in the cazas of West Bekaa, Zahle and Baalbeck.

To account for a representative distribution of the sample, Information International allocated the 700 questionnaires of the survey in the related three cazas according to the population weight of the Litani River Basin villages located in these cazas, as per the registered number of voters according to the official statistics of the Ministry of Interior and Municipalities for the year 2010.

After calculating the number of questionnaires to be allocated to each caza, Information International drew a random sample of villages in the relevant cazas where the survey would be implemented. Therefore, the total number of questionnaires administered in each caza was proportionally distributed between the selected villages, based on the population weight of each.

Information International adopted a multi-stage probability sampling to ensure a random, representative sample for identifying households and main respondents.

The first stage consisted of selecting neighborhoods inside each selected area in a way to represent the make-up of the areas, the second stage consisted of selecting households based on a systematic random sample in each selected neighborhood according to the estimated number of buildings in the neighborhood, and finally the third stage consisted of sampling a primary respondent within each household based on the most recent birthday.

The interviewer asked about the total number of adults aged 21 years and above living in the household, and chose the one with the most recent birthday (at the date of the interview) to be the main respondent. If the selected person is not at home, a follow-up up to one time was conducted before declaring a non response. This method ensured that everyone has an equal chance of inclusion, with no one allowed to self-select into the sample.

If the selected respondent accepted to participate in the survey, the respondent was explained the objectives of the survey and re-assured that the questionnaire is voluntary, anonymous and confidential.

Face to face interviews were conducted with the selected respondents, using the questionnaire approved by IRG that addresses the research questions/themes developed for this project.

3.3. PROBLEMS FACED IN THE FIELD

The data collection was undertaken by eleven experienced field workers and three supervisors. As per Ii's policy, the field workers were first trained by a Senior Analyst on the questionnaire before the field survey.

Throughout the data collection period, the following problems were faced by the field work team:

- Difficulties in finding the potential respondents at home before noon, as most of them were either at work or at university, which necessitated follow ups and condensed working hours starting the afternoon periods.

- The lack of interest of respondents in water related surveys, where they expressed their perceptions of the non-usefulness of such surveys in implementing any positive change or action in this field.

3.4. DATA CHECKING/ENTRY/ANALYSIS

Once the questionnaires were cleared by the supervisors, they were transferred to the coding/entry department where they underwent complete logical checking. The coding officers carried out the following tasks:

- Assigning a serial number to each questionnaire
- Reviewing each questionnaire
- Coding each complete questionnaire.

In order to ensure the accuracy of information, the data entry function and the data cleaning were carried out independently, using the ACCESS program.

The Assistant Analyst and the Database Developer, especially trained by the Data Analyst Supervisor for the application, were responsible for structuring the application and checking the work of the data operators.

The Senior Analyst investigated the findings in accordance with the study objectives and management instructions. The SPSS software package was utilized for the data analysis.

4. SURVEY RESULTS

4.1. SAMPLE DESCRIPTION

The sample consisted of 700 interviews conducted in three Cazas surrounding the course of the river; Baalbeck (upper stream) Zahle (middle stream) and West Bekaa (lower stream).

The survey was distributed almost equally among the two genders, with 54% of respondents being males, and 46% being females. Their ages ranged from 21 to 64 with the highest percentage for the age group of 40 to 44 (17.1%) (Table 4.1).

Table 4.1: Age Distribution

Age of Respondents	Percentage
21-24	9.1%
25-29	8.6%
30-34	13.4%
35-39	14%
40-44	17.1%
45-49	13.9%
50-54	10.3%
55-59	8.3%
60-64	5.3%
Total	*100%*

The questionnaires were distributed geographically among a number of villages within the three mentioned Cazas. The numbers of respondents per each village are presented in Table 4.2.

Table 4.2: Geographic Distribution

Village	Cazas			Total Frequency	Percentage
	Baalbeck	West Bekaa	Zahle		
Chmistrar	41	0	0	41	5.9%
Nabi Shit	20	0	0	20	2.9%
Bednayel	17	0	0	17	2.4%
Tamnine el Tahta	15	0	0	15	2.1%
Tamnine el Fawka	10	0	0	10	1.4%
Machghara	0	47	0	47	6.7%
Quaraoun	0	30	0	30	4.3%
Jeb Jannin	0	28	0	28	4.0%
Marej	0	28	0	28	4.0%
Saghbine	0	18	0	18	2.6%
Sultan Yaakoub	0	15	0	15	2.1%
Baaloul	0	11	0	11	1.6%
Mansoura	0	10	0	10	1.4%
Kefraya	0	9	0	9	1.3%
Ammik	0	8	0	8	1.1%
Zahle	0	0	246	246	35.1%
Bar Elias	0	0	37	37	5.3%
Anjar	0	0	26	26	3.7%
Saadnayel	0	0	20	20	2.9%
Jdita	0	0	15	15	2.1%
Ferzol	0	0	14	14	2.0%
Kfar Zabad	0	0	15	15	2.1%
Mrayjeit	0	0	10	10	1.4%
Bouarej	0	0	10	10	1.4%
Total	***103***	***204***	***393***	***700***	***100%***

The educational level of the respondents revealed that only a small percentage had acquired higher education degrees (16.7% with Bachelor degrees, and 2.9% with Masters Degrees). The majority (33%) have reached the secondary level (Figure 4.1).

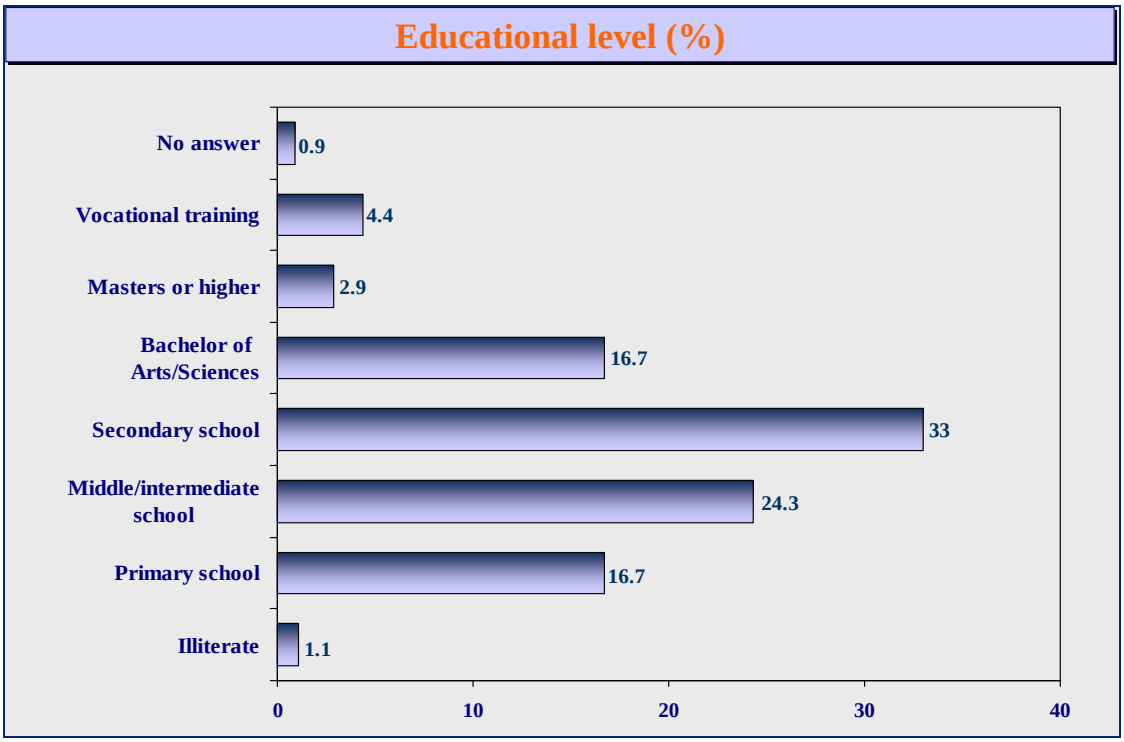

Figure 4.1: Educational Level of Respondents

Table 4.3 displays the distribution of professions between the genders. Not surprisingly, the percentages of men in agriculture, industry and public sector are much higher than those for women. 47.5% of women are housewives, 37.6% are in the services sector, but very small percentages are found in the other sectors.

Table 4.3: Distribution of Professions by Gender

Profession	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Agriculture	46	12.2%	7	2.2%	53	7.6%
Services	187	49.5%	121	37.6%	308	44%
Industry	56	14.8%	3	0.9%	59	8.4%
Public sector	69	18.3%	12	3.7%	81	11.6%
University Students	7	1.9%	11	3.4%	18	2.6%
Housewife	0	0%	153	47.5%	153	21.9%
Unemployed	13	3.4%	15	4.7%	28	4%

4.2. ASSESSMENT OF THE AWARENESS CAMPAIGN

4.2.1. VISIBILITY AND LIKENESS

The recent awareness campaign about water pollution that was undertaken in the area of interest achieved limited visibility. Only 22.1% of the 700 respondents said that they had seen the billboards on the roads about water pollution (Figure 4.2).

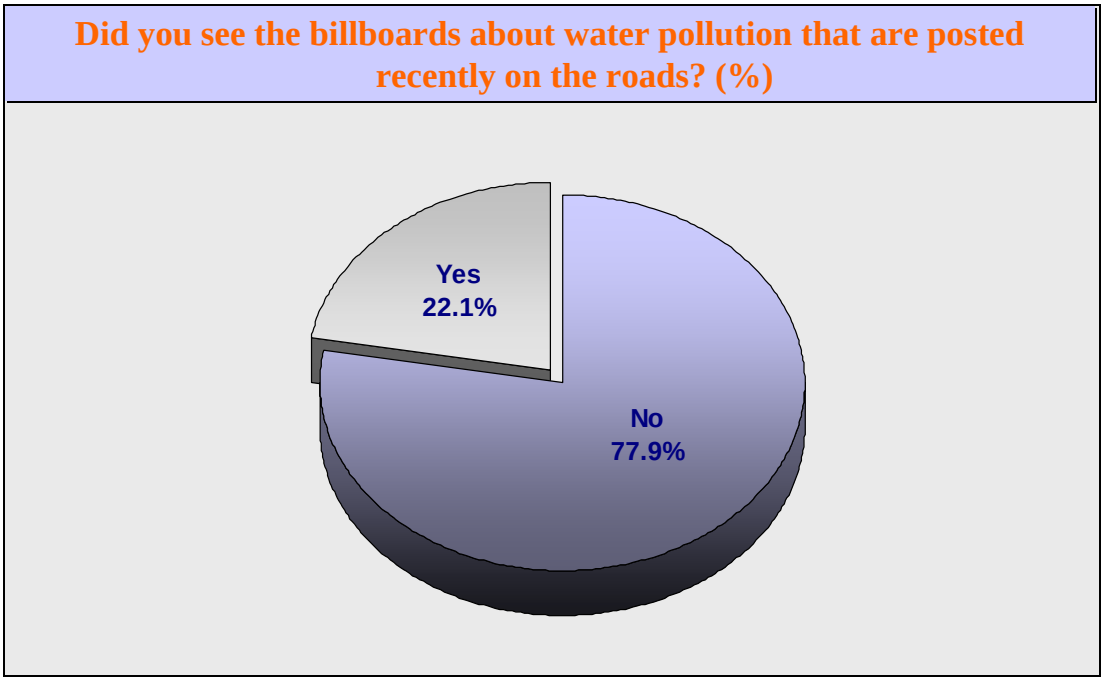

Figure 4.2: Did you see the billboards about water pollution that are posted recently on the roads?

The visibility of the relevant billboards was much better in Baalbeck than in the other Cazas. Table 4.4 shows that 43.7% of Baalbeck residents saw them, while only 19.6% and 17.8% of those in the West Bekaa and Zahle did. This result may be related to the placement location of the posters in each of the relevant three cazas.

Table 4.4: Visibility of Road-side Billboards by Cazas

Billboard seen	Cazas						Total	
	Baalbeck		West Bekaa		Zahle		Frequency	%
	Frequency	%	Frequency	%	Frequency	%		
Yes	45	43.7%	40	19.6%	70	17.8%	155	22.1%
No	58	56.3%	164	80.4%	323	82.2%	545	77.9%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

Of the respondents who did see them, a good majority of 81.9% expressed a liking to them, with 18.1% not liking them (Figure 4.3).

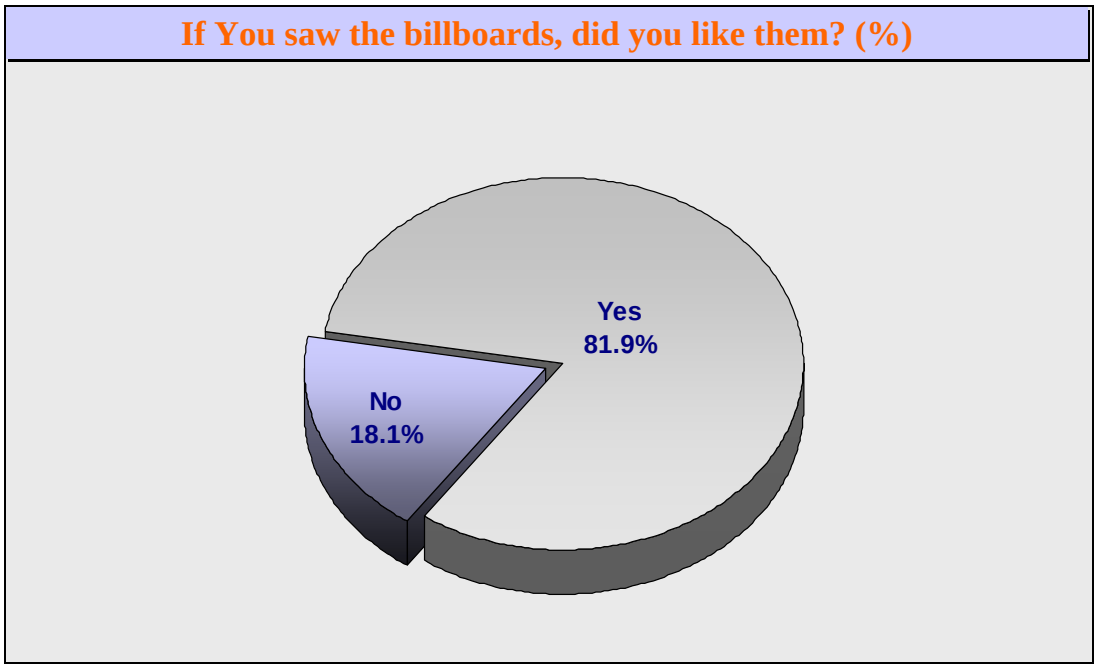

Figure 4.3: If you saw the billboards, did you like them?

In the first case, 74% said they liked them because of the messages that they conveyed. Figure 4.4 shows that other reasons were mostly concerned with aesthetics (drawing, slogan, and color).

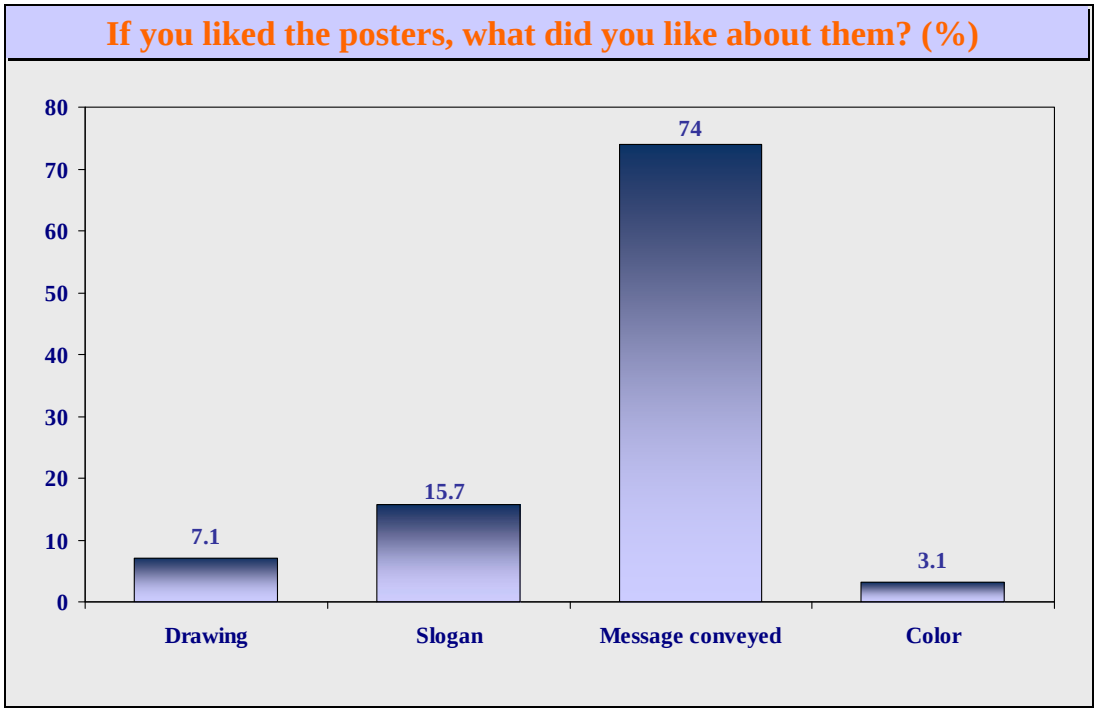

Figure 4.4: If you liked the posters, what did you like about them?

Males and females had different reasons for liking the posters. The men were generally more attracted to the slogans than women with 21% saying they mainly liked the slogan, whereas only 10.8% of women sharing that opinion. The drawing of the posters was more appreciated by female respondents rather than males (10.8% and 3.2% respectively) (Table 4.5).

Table 4.5: What did you like about the posters? By Gender

What did you like?	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Drawing	2	3.2%	7	10.8%	9	7.1%
Slogan	13	21%	7	10.8%	20	15.7%
Message conveyed	45	72.6%	49	75.4%	94	74%
Color	2	3.2%	2	3.1%	4	3.1%
Total	***62***	***100%***	***65***	***100%***	***127***	***100%***

Those who did not like the posters (28 respondents) had more reasons for doing so. The majority however, attributed it to the drawing and the message conveyed (25% respectively). An interesting reason that was revealed by 10.7% of the respondents was that the billboards only presented a problem without proposing a solution for it (Figure 4.5).

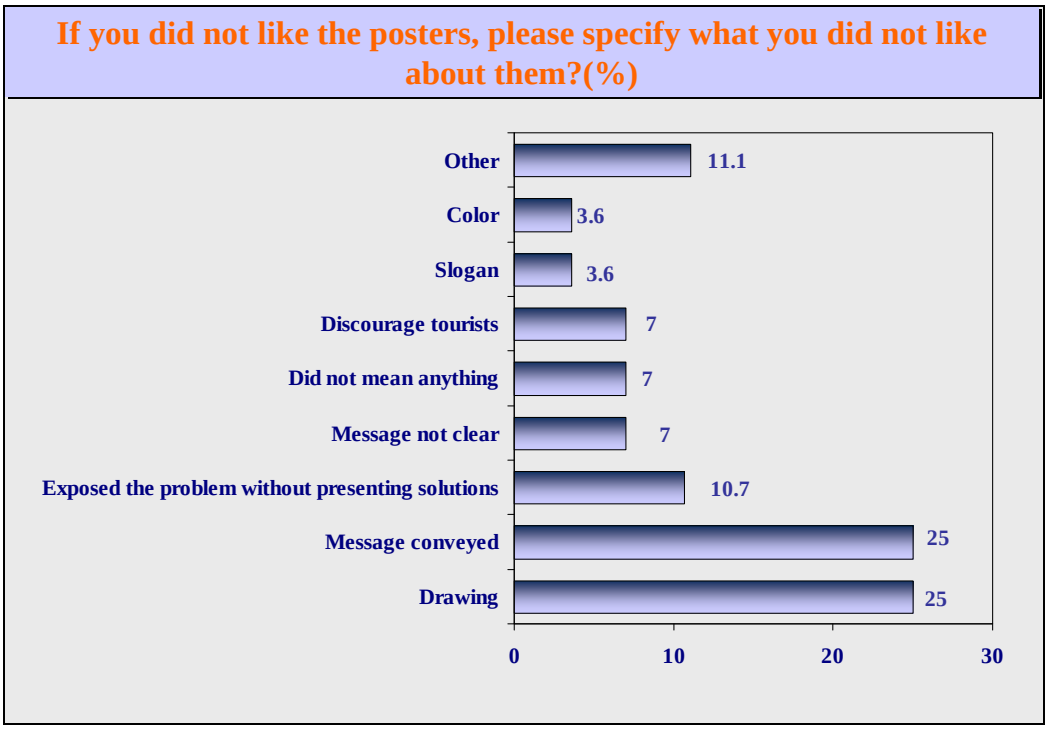

Figure 4.5: If you did not like the posters, please specify what you did not like about them?

4.2.2. MESSAGES CONVEYED AND EFFECT ON BEHAVIOR CHANGE

The main messages perceived by the 155 viewers of the billboards were 'reduction of pollution' and 'reduce water wastages' where 36.1% and 33.5% of respondents listed those two answers respectively (Figure 4.6). Other messages that were picked up on were awareness programs, the irresponsibility of the government, and providing water for all.

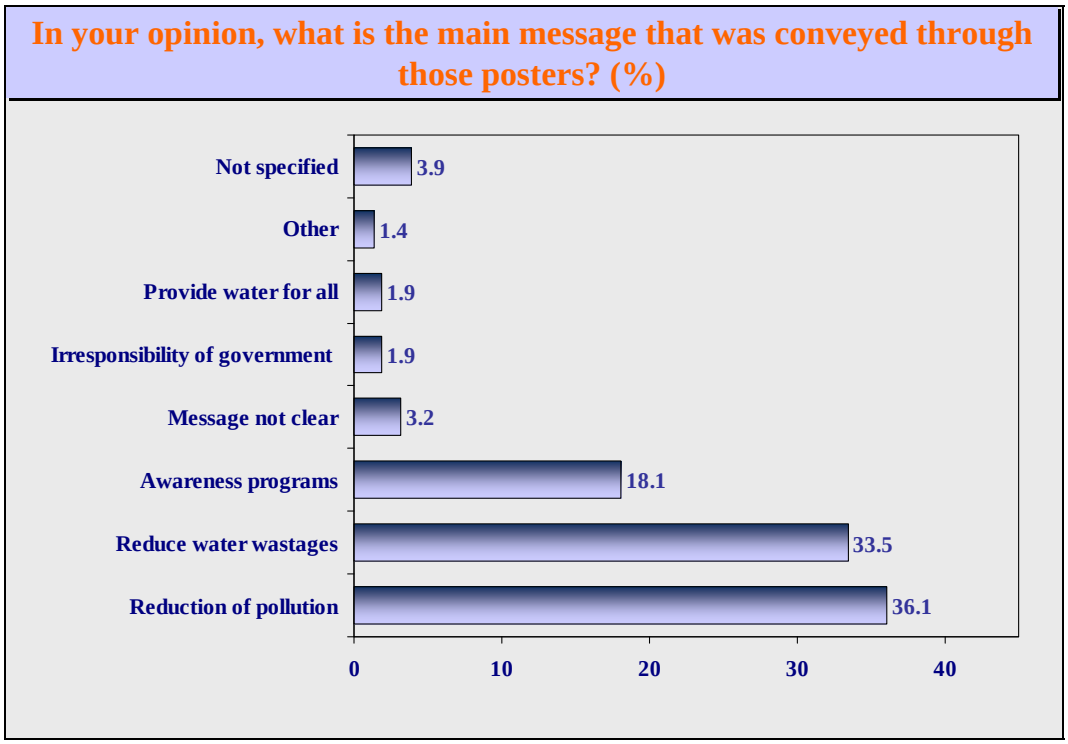

Figure 4.6: In your opinion, what is the main message conveyed through these posters?

Certain discrepancies were gauged between the perceptions of women and men. More men found the posters related to awareness programs than women (22.8%), and though a small percentage of women said the messages were unclear (6.6%), none of the male respondents gave this answer. These numbers are presented in Table 4.6.

Table 4.6: Messages Conveyed through the Posters: By Gender

What did you like?	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Reduction of pollution	28	35.4%	28	36.8%	56	36.1%
Reduce water wastages	27	34.2%	25	32.9%	52	33.5%
Awareness Program	18	22.8%	10	13.2%	28	18.1%
Message unclear	0	0%	5	6.6%	5	3.2%
Irresponsibility of government	1	1.3%	2	2.6%	3	1.9%
Financed by the US	0	0%	1	1.3%	1	0.7%
Provide water for all	1	1.3%	2	2.6%	3	1.9%
Discourage tourists	1	1.3%	0	0%	1	0.7%
Not specified	3	3.8%	3	3.9%	6	3.9%
Total	***79***	***100%***	***76***	***100%***	***155***	***100%***

When asked whether they agree with the message they perceived to be conveyed through those posters, in general, the vast majority of 88.4% of respondents reported to agree with them (Figure 4.7).

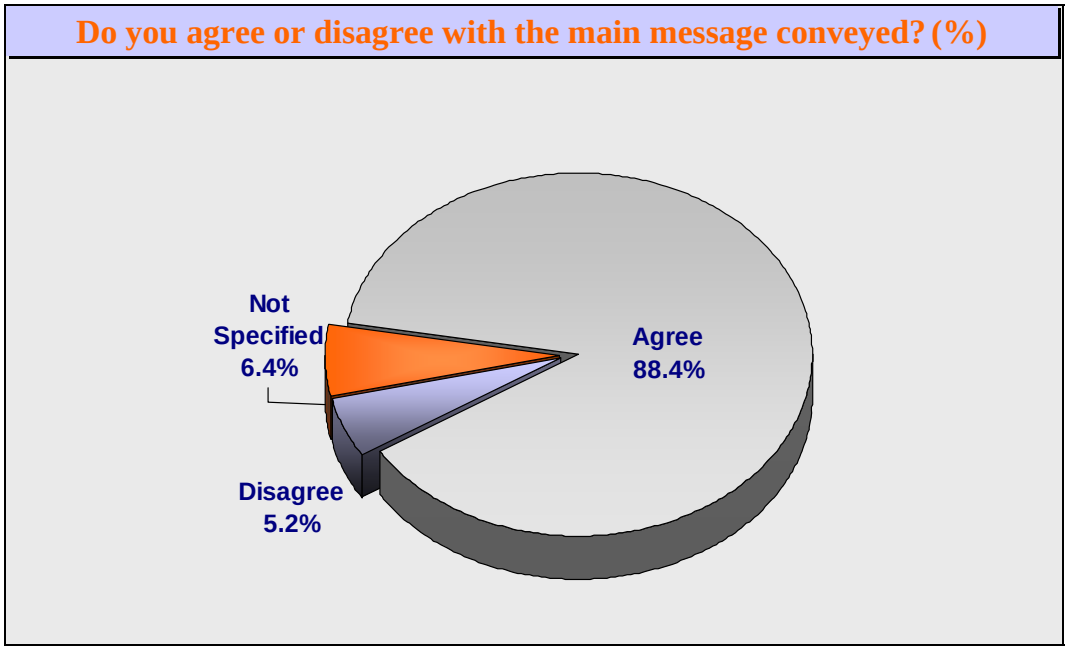

Figure 4.7: Do you agree or disagree with the main message conveyed?

Looking into each message in specific, we can see that the majority of respondents who reported that the posters convey various messages agree with these messages, except the message of "Financed by the

United States" and "Discourage tourists", where the respondents reported these messages disagreed with them (Table 4.7).

Table 4.7: Do you agree or disagree with the main message conveyed? By Message

	Agree	Disagree	Not Specified	Total
Reduction of Pollution	51	3	2	56
	91.1 %	5.4 %	3.6 %	100.0 %
Reduce water wastages	50	2	0	52
	96.2 %	3.8 %	0 %	100.0 %
Awareness programs	28	0	0	28
	100.0 %	0 %	0 %	100.0 %
The message is not clear	0	0	5	5
	0 %	0 %	100.0 %	100.0 %
Indicator that the government is not responsible	3	0	0	3
	100.0 %	0 %	0 %	100.0 %
Financed by the United States	0	1	0	1
	0 %	100.0 %	0 %	100.0 %
Provide water for all	2	1	0	3
	66.7 %	33.3 %	0 %	100.0 %
Discourage tourists	0	1	0	1
	0 %	100.0 %	0 %	100.0 %
Not Specified	3	0	3	6
	50.0 %	0 %	50.0 %	100.0 %
Total	137	8	10	155
	83.4 %	5.2 %	6.5 %	100.0 %

The majority of the viewers (27.7%) said that the posters made them happy. But 27.1% said that they felt nothing when they saw them. 16.1% said that the billboards made them sad, while 14.2% said they made them angry. This is detailed in Figure 4.8.

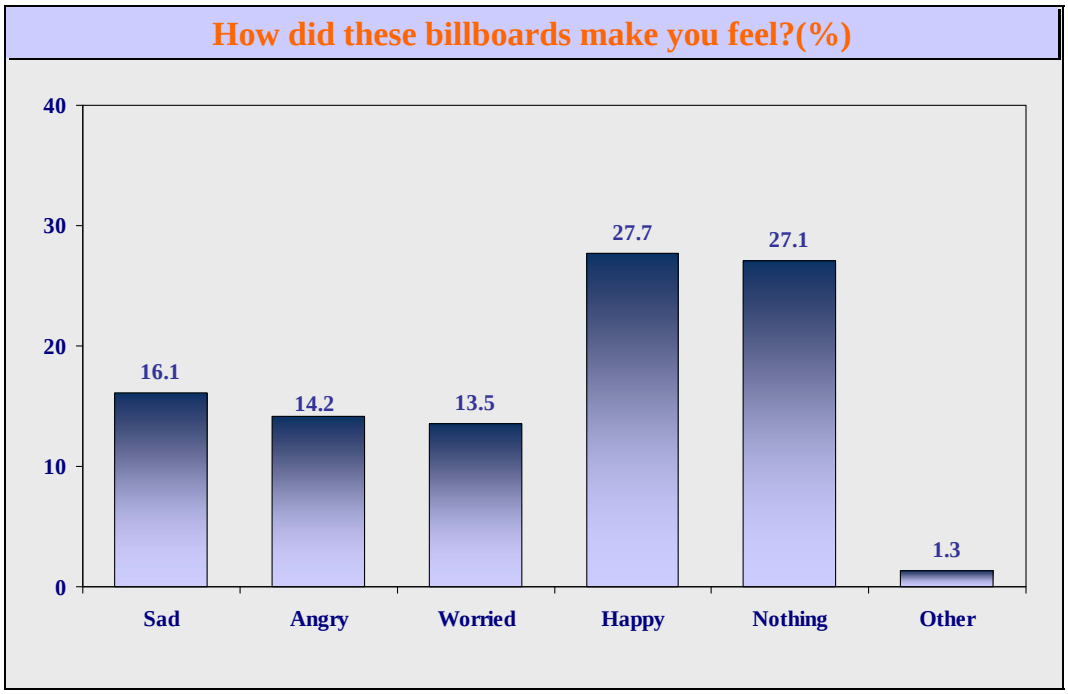

Figure 4.8: How did these billboards make you feel?

It is interesting to note, that the different Cazas exhibited different results. In Baalbeck, the bulk of responses (44.4%) answered happy. In the other two Cazas, the answers were more spread out and higher percentages were noted for 'worried' than in Baalbeck (Table 4.8).

Table 4.8: Feelings about the Billboards by Cazas

Feeling	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Sad	6	13.3%	9	22.5%	10	14.3%	25	16.1%
Angry	1	2.2%	6	15%	15	21.4%	22	14.2%
Worried	3	6.7%	7	17.5%	11	15.7%	21	13.5%
Happy	20	44.4%	10	25%	13	18.6%	43	27.7%
Nothing	15	33.3%	8	20%	19	27.1%	42	27.1%
Not Specified	0	0%	0	0%	2	2.9%	2	1.3%
Total	***45***	***100%***	***40***	***100%***	***70***	***100%***	***155***	***100%***

The genders also exhibited different results. Men were more inclined to feel worried or angry than the women did. 21.5% felt angry, and 15.2% worried. For the women these numbers dropped to 6.6% and 11.8% respectively. In addition 34.2% of the female respondents reported that they felt "Nothing" when they saw the related posters on the billboards, compared to 20.3% of male respondents (Table 4.9).

Table 4.9: Feelings about the billboards by gender

Feeling	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Sad	10	12.7%	15	19.7%	25	16.1%
Angry	17	21. 5%	5	6.6%	22	14. 2%
Worried	12	15. 2%	9	11.8%	21	13. 5%
Happy	23	29.1%	20	26.3%	43	27.7%
Nothing	16	20. 3%	26	34.2%	42	27.1%
Not Specified	1	1.3%	1	1.3%	2	1.3%
Total	***79***	***100%***	***76***	***100%***	***155***	***100%***

Keeping in mind that 27.1% of the respondents felt nothing when looking at the billboards, the survey results also show that 59.4% said that the advertisement did not have any effect on how they behave about waste discharge (Figure 4.9).

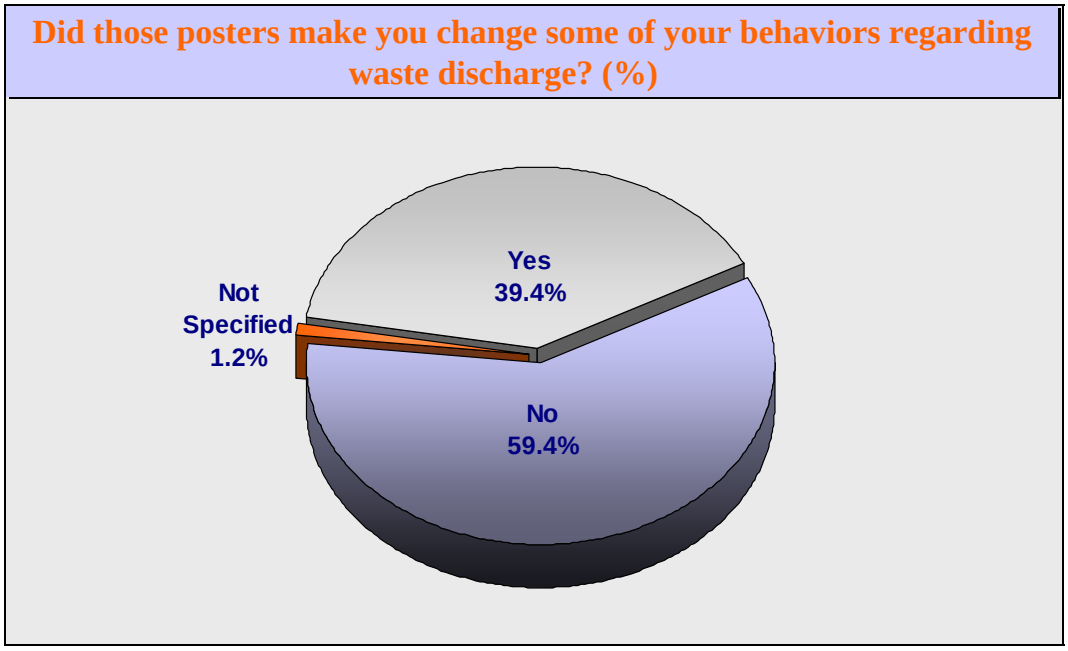

Figure 4.9: Did those posters make you change some of your behaviors regarding waste discharge?

This attitude was more prevalent among women, as a larger percentage of 64.5% said the posters did not change their behavior about waste discharge (Table 4.10). Looking at the data presented in Table 4.9 and Table 4.10, we can detect better responsiveness to the posters on the behalf of men.

Table 4.10: Did those posters make you change some of your behaviors regarding waste discharge? By gender

Change Behavior	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Yes	34	43%	27	35.5%	61	39.4%
No	43	54.4%	49	64.5%	92	59.4%
Not Specified	2	2.5%	0	0%	2	1.2%
Total	***79***	***100%***	***76***	***100%***	***155***	***100%***

Those who reported the posters made them change some of their behaviors regarding waste discharge specified two main changes in their behavior, that were mainly positive changes about water management. As shown in Figure 4.10, 61% reported to have reduced their water consumption, while another 39% of the respondents said it encouraged them to preserve cleanliness.

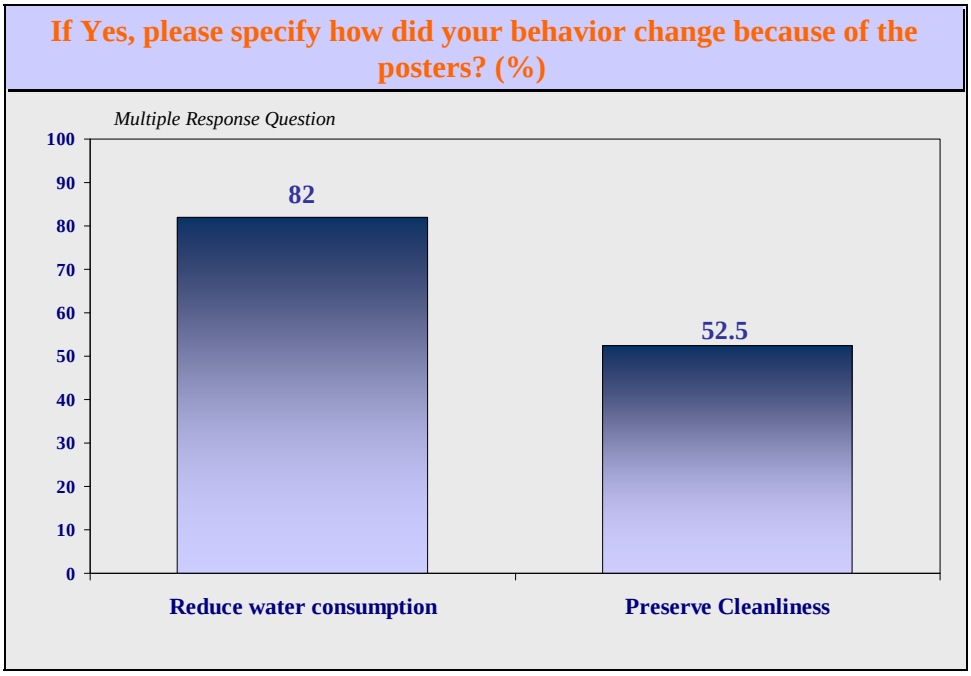

Figure 4.10: If yes, please specify how did your behavior change because of the posters?

Table 4.11 shows that reducing water consumption as a result of the posters was implemented more in West Bekaa and Zahle (95% and 91.3% respectively), while preserving cleanliness as a behavioral change because of the posters was more applied in Baalbeck (66.7%).

Table 4.11: Behavioral change by Cazas

Behavior	Cazas						Total
	Baalbeck		West Bekaa		Zahle		
	Frequency	%	Frequency	%	Frequency	%	Frequency
Reduce water consumption	10	55.6%	19	95%	21	91.3%	50
Preserve Cleanliness	12	66.7%	11	55%	9	39.1%	32
Total (#)	***18***		***20***		***23***		***61***

4.2.3. EFFECTIVENESS OF VARIOUS METHODS IN CONVEYING MESSAGES TO PUBLIC

Along the same lines, respondents were asked to rate the degree of effectiveness of various methods in conveying messages to the public. The scale was set from 1 to 5, with one being 'not effective at all' and 5 being 'very effective'. The proposed methods for advertisement were TV documentaries, municipality meetings, radio ads, and billboard campaigns. Of those mentioned, TV documentaries was rated as having the highest effectiveness in conveying messages to the public, with 80% of respondents ranking it as 'very effective' (Figure 4.11).

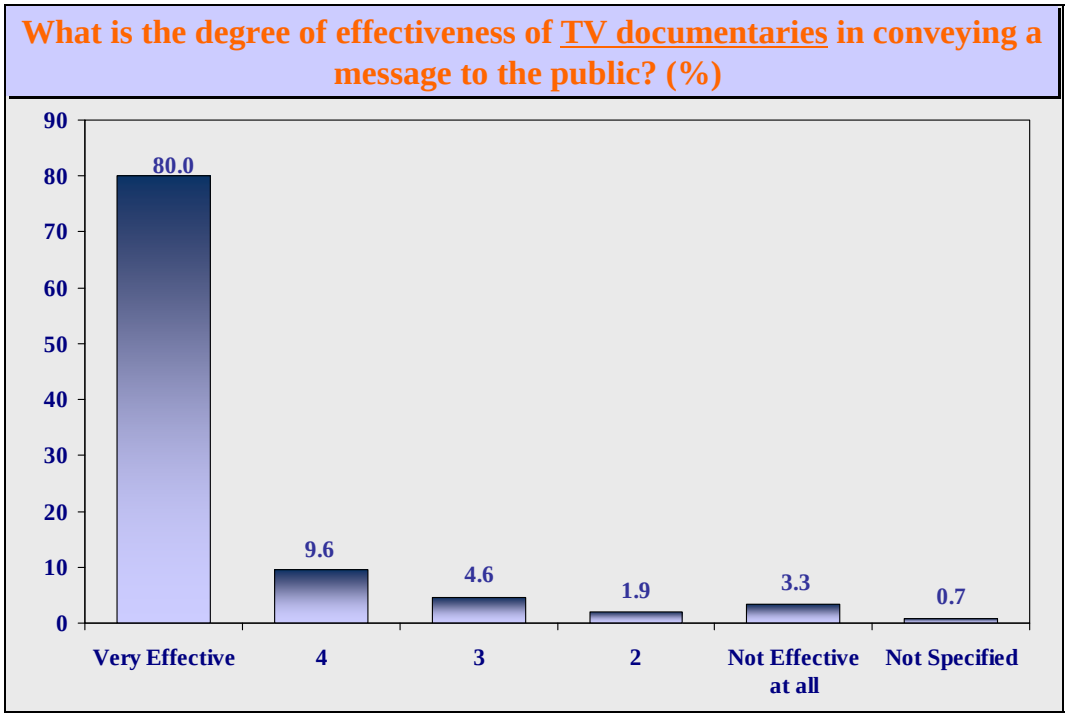

Figure 4.11: Degree of effectiveness of TV documentaries in conveying a message to the public?

TV documentaries were followed by meetings at municipalities, with 50.4% of respondents rating these meetings as "very effective" in conveying messages to the public (Figure 4.12).

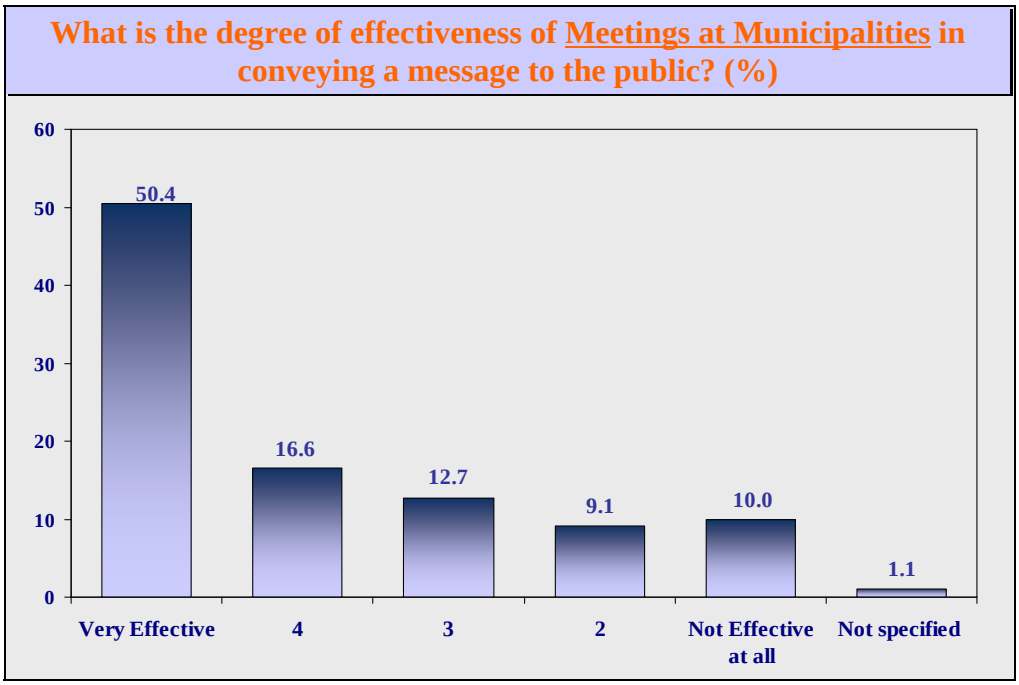

Figure 4.12: Degree of effectiveness of meetings at municipalities in conveying a message to the public?

Billboards campaigns ranked third in their effectiveness in convening messages to the public (40.1%), followed at the end by the radio ads with 29.9% only of respondents rating this advertising method as being very effective and another 17.6% rating it as "Not effective at all"(Figure 4.13 and Figure 4.14).

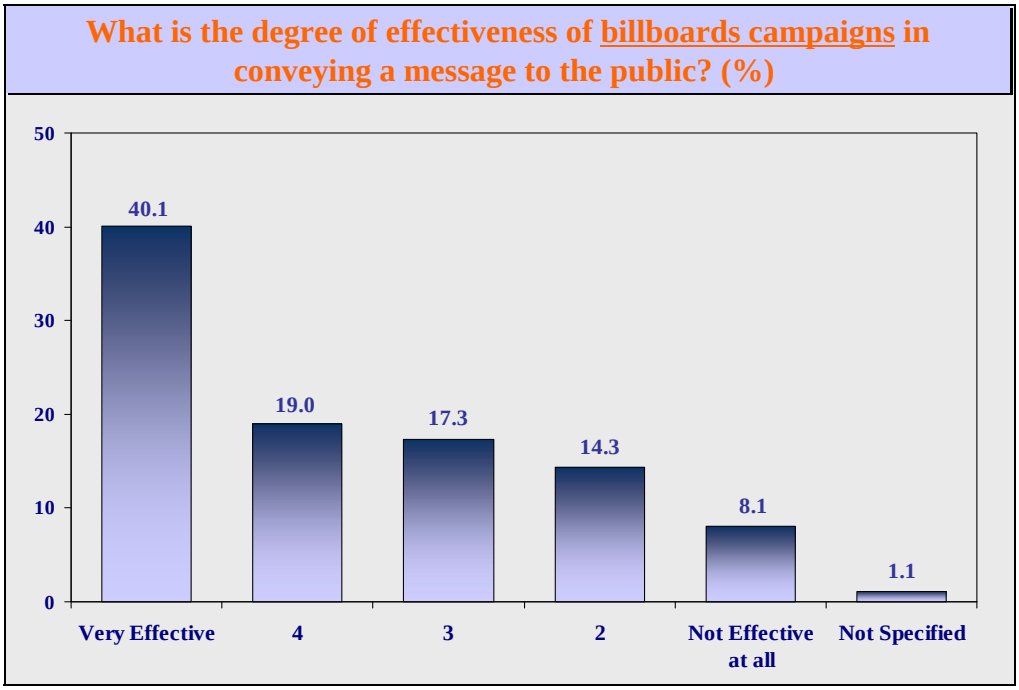

Figure 4.13: Degree of effectiveness of Billboards Campaigns in conveying a message to the public?

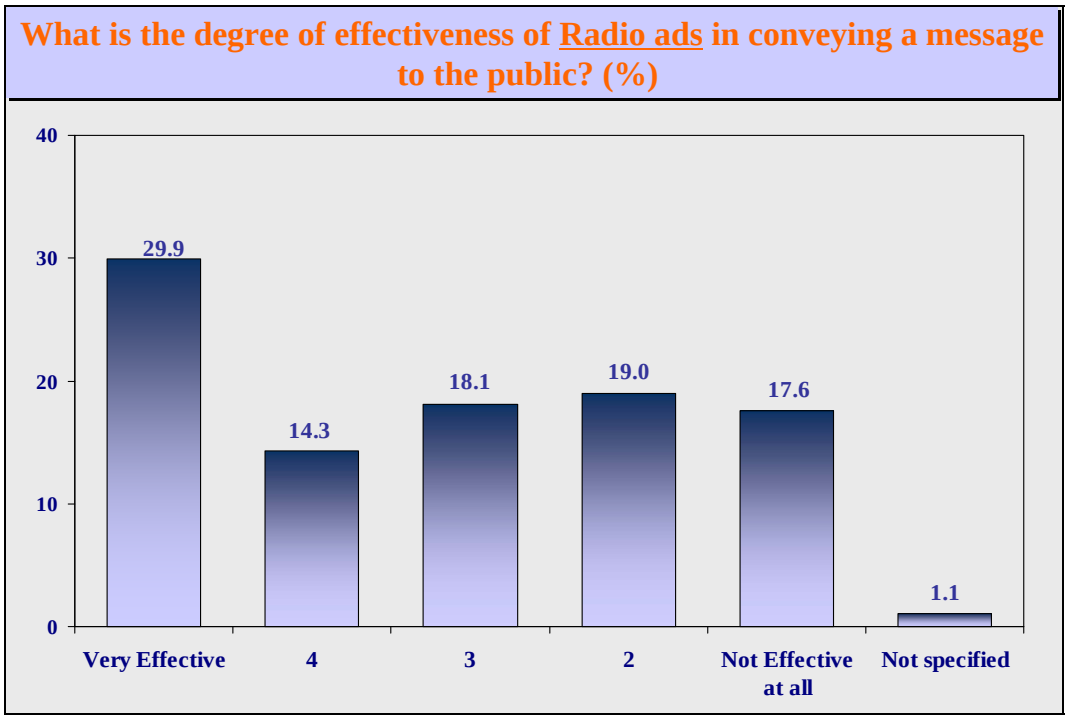

Figure 4.14: Degree of effectiveness of Radio ads in conveying a message to the public?

The Caza of West Bekaa exhibited more trust in the effectiveness of their municipality meetings in conveying messages to the public. While all Cazas had high percentages of residents saying that meetings would be very effective, in West Bekaa it was 61.3% compared to 32% and 49.6% respectively in Baalbeck and Zahle (Table 4.13).

Table 4.12: Degree of effectiveness of municipality meetings in conveying messages to public, by Caza

Effectiveness of Municipality Meetings	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1 (Not effective at all)	13	12.6%	18	8.8%	39	9.9%	70	10%
2	16	15.5%	16	7.8%	32	8.1%	64	9.1%
3	20	19.4%	14	6.9%	55	14%	89	12.7%
4	21	20.4%	30	14.7%	65	16.5%	116	16.6%
5 (Very Effective)	33	32%	125	61.3%	195	49.6%	353	50.4%
Not specified	0	0%	1	0.5%	7	1.8%	8	1.1%
Total	***103***	***100%***	***204***	***100%***	***393***	***100***	***700***	***100%***

The effectiveness of the radio ads in conveying messages to public does not necessarily apply for Baalbeck though, as 53.4% of its residents reported it was 'not effective at all', while none reported it was 'very effective'. Table 4.13 below presents the details of this question.

Table 4.13: Degree of effectiveness of radio ads by Cazas

Effectiveness	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1 (Not effective at all)	55	53.4%	14	6.9%	54	13.7%	123	17.6%
2	22	21.4%	43	21.1%	68	17.3%	133	19%
3	13	12.6%	41	20.1%	73	18.6%	127	18.1%
4	13	12.6%	37	18.1%	50	12.7%	100	14.3%
5 (Very Effective)	0	0%	68	33.3%	141	35.9%	209	29.9%
Not specified	0	0%	1	0.5%	7	1.8%	8	1.1%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

7.7% of all the respondents (54 respondents) added the option of 'other' to the list of advertising methods they thought would be effective in conveying messages to the public. For this small percent of respondents, the list of options cited included but was not limited to: awareness at schools, internet advertisements, fines and penalties, ads within villages and not only on highways as well as water meters (Table 4.14).

Table 4.14: Other methods that are perceived to be effective in conveying messages to the public

Other Methods	Frequency	Percentage
Awareness at Schools	22	40.7%
Internet Advertisement	13	24.1%
Fines and Penalties	7	13%
Advertisements within villages and not on highways	4	7.4%
Water meters	3	5.6%
Awareness through ministries	3	5.6%
Instructions on invoices or flyers	2	3.7%
Total	***54***	***100***

4.3. WATER RELATED PROBLEMS AND THEIR SOURCES

4.3.1. LARGEST USE OF WATER IN THE BEKAA

Moving to water related problems and solutions, the survey looked first into how the residents of the sampled villages ranked the largest uses of water in the Bekaa. For this purpose, respondents were asked to rank the top three priorities, and the options for uses were kept open-ended. 84.5% of respondents listed domestic use, followed by 75.4% who listed 'irrigation of agricultural crops', while 43.8 % reported that water for drinking is a main priority use if water in the Bekaa area. Other uses mentioned by respondents, as detailed in Figure 4.15, include industry, electricity, and tourist places.

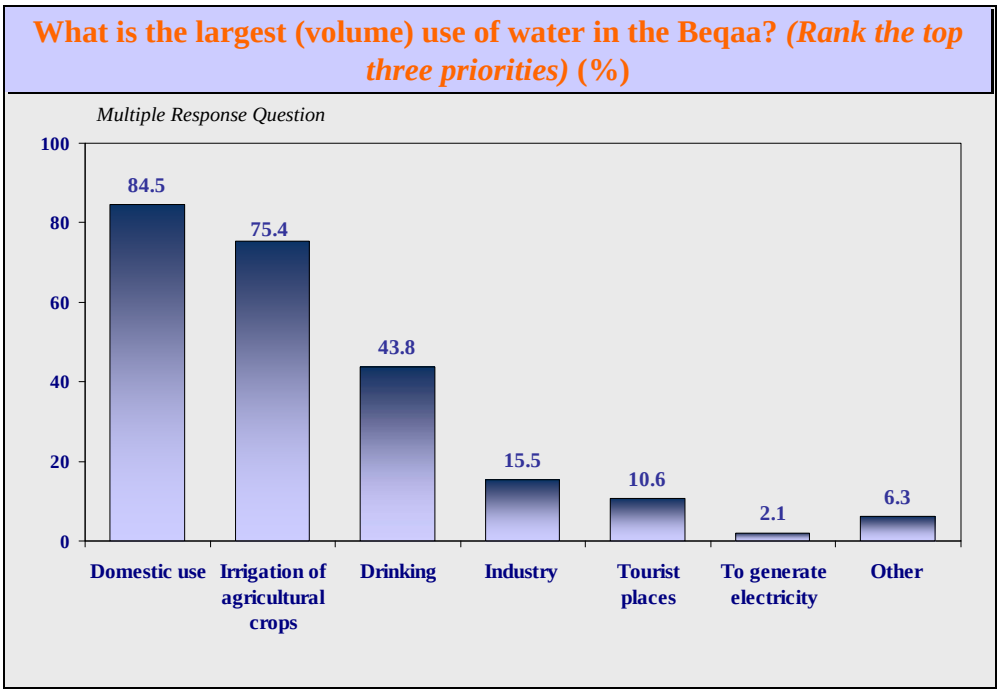

Figure 4.15: What is the largest (volume) use of water in the Bekaa? (Rank the top three priorities)?

4.3.2 WATER RELATED PROBLEMS

The perceptions of respondents concerning the top three water-related problems that they encounter and their causes are clearly expressed. The problem that ranked first was water pollution (56.4%), followed by water scarcity (33.4%) and water delivery shortages (27.1%) (Figure 4.16).

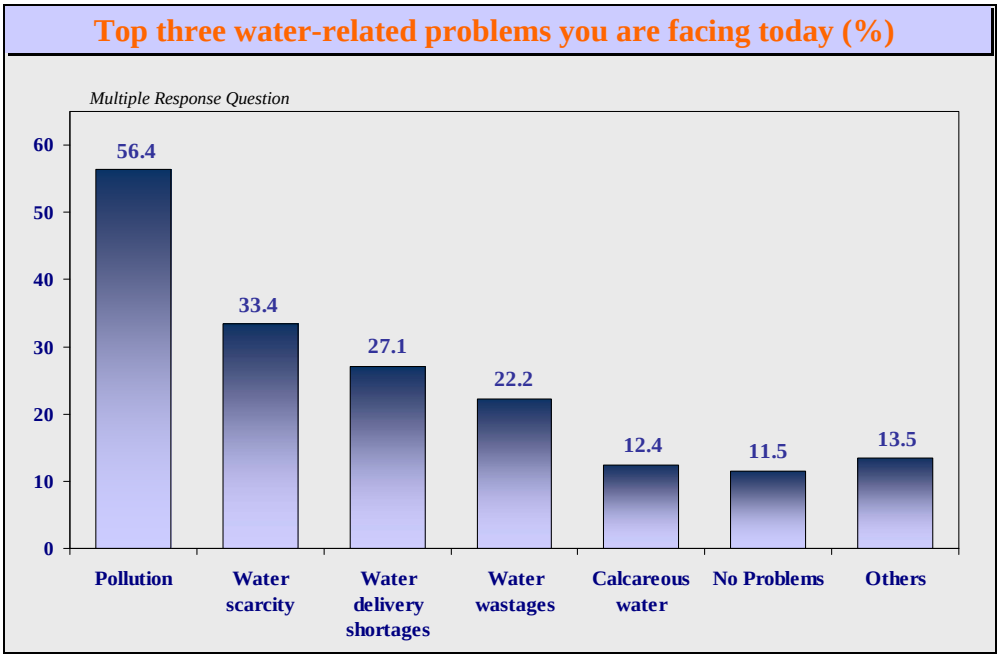

Figure 4.16: Top three water-related problems you are facing today

The main concern mentioned about water pollution was felt in the upper stream of the Litani river in Baalbeck, with 86.4% of its residents listing it as a major concern, while 53.4% of the West Bekaa's and 48.1% of Zahle's did. However, water delivery shortages were mainly expressed by Zahle residents (Table 4.15). This could indicate a serious issue of pollution in the river, and much more so in the region of Baalbeck.

Table 4.15: Water-related problems: By Cazas

Problems	Cazas						Total Frequency
	Baalbeck		West Bekaa		Zahle		
	Frequency	%	Frequency	%	Frequency	%	
Pollution of water	89	86.4%	109	53.4%	189	48.1%	387
Water scarcity	55	53.4%	26	12.7%	148	37.7%	229
Water delivery shortages	5	4.9%	48	23.5%	133	33.8%	186
Water wastages	81	78.6%	24	11.8%	47	12%	152
Calcareous water	1	1%	28	13.7%	56	14.2%	85
No Problems	0	0%	39	19.1%	40	10. 2%	79
Other	7	6.8%	26	12.7%	74	18.8%	107
Total frequency	***103***		***204***		***393***		***700***

Water problems were also perceived differently by the two genders. Problems of water delivery shortages and pollution were a more pressing concern for women than men. The two categories had a percentage of 32.6% and 60.6% of women respectively citing them. For men, these numbers were 21.4% and 50.8% (Table 4.16).

Table 4.16: Water problems by gender

Problems	Male		Female		Total Frequency
	Frequency	%	Frequency	%	
Pollution of water	192	50.8%	195	60.6%	387
Water scarcity	133	35.2%	96	29.8%	229
Water delivery shortages	81	21.4%	105	32.6%	186
Water Wastages	86	22.8%	66	20.5%	152
Calcareous water	47	12.4%	38	11.8%	85
No Problems	48	12.7%	31	9.6%	79
Other	70	18.5%	37	9.4%	107
Total	***378***		***322***		***700***

As for the sources of these problems, 42.7% of respondents associated the causes to be related to the sewage system. Absence of control/maintenance was the second main cause at 28.3%. Another 24.9% of the problems were attributed to the network and 23.4% to the waste of water (Figure 4.17).

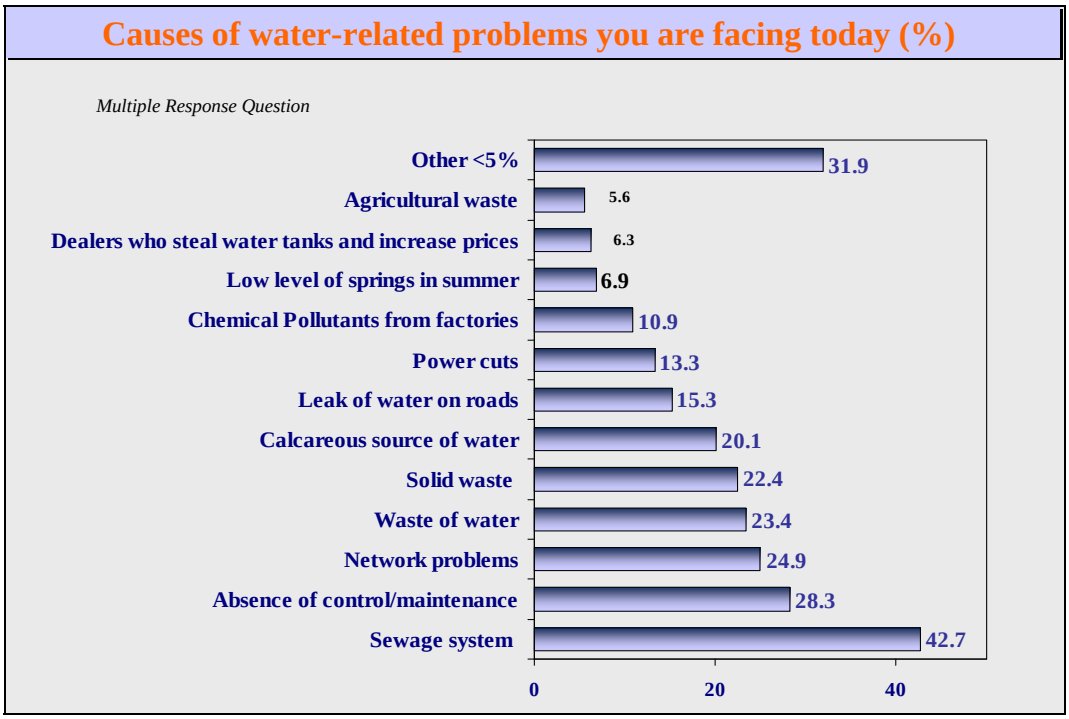

Figure 4.17: Causes of the water-related causes you are facing today

Looking at specific problem-cause relations, the survey results show that water pollution is mainly attributed to the sewage system (63.6%), followed by solid waste (33.6%) and chemical pollutants from factories (16.5%) (Table 4.17).

Table 4.17: Causes attributed to water pollution

Reason for water pollution	sewage system	246	63.6
	solid waste	130	33.6
	chemical pollutants from factories	64	16.5
	agricultural waste	34	8.8
	absence of control/ study/ maintenance	26	6.7
	calcareous source of water	21	5.4
	network problems	19	4.9
	quarries	14	3.6
	polluted water source	7	1.8
	lack of organisation of pipes/ leak of water on the roads	6	1.6
	do not know	4	1
	refineries are not running	3	0.8
	animals farm	3	0.8
	slaughter houses	2	0.5
	favortism	1	0.3
Total		**387**	**149.9**

As for the second major water related problem (water scarcity), this was mainly attributed to network problems (37.1), waste of water (18.3%), power cuts (16.6%) as well as absence of control/maintenance (14.4%) (Table 4.18).

Table 4.18: Causes attributed to water scarcity

Reason for water pollution	network problems	85	37.1
	waste of water	42	18.3
	power cuts	38	16.6
	absence of control/ study/ maintenance	33	14.4
	lack of organisation of pipes/ leak of water on the roads	27	11.8
	dealers who steal water tanks and increase prices	25	10.9
	low level of springs in the summer	22	9.6
	favortism	18	7.9
	technical failure	12	5.2
	distribution of water to many places	9	3.9
	pumps	7	3.1
	do not know	7	3.1
	lack of water storage/ need for dams	5	2.2
	irrigation of agricultural crops	2	0.9
	climate change	1	0.4
	quarries	1	0.4
	counters- meters	1	0.4
Total		**229**	**146.3**

As for the third major water related problem (water delivery shortages), this was attributed to absence of control/maintenance (26.9%), power cuts (22.6%), network problems (17.7%) and waste of water (12.4%) (Table 4.19).

Table 4.19: Causes attributed to Water delivery shortages

Reason for water pollution	absence of control/ study/ maintenance	50	26.9
	power cuts	42	22.6
	network problems	33	17.7
	waste of water	23	12.4
	lack of organisation of pipes/ leak of water on the roads	18	9.7
	low level of springs in the summer	15	8.1
	distribution of water to many places	15	8.1
	do not know	10	5.4
	technical failure	9	4.8
	lack of water storage/ need for dams	6	3.2
	dealers who steal water tanks and increase prices	6	3.2
	irrigation of agricultural crops	5	2.7
	favortism	2	1.1
Total		**186**	**125.8**

4.3.3 SURFACE WATERS

A large percentage of respondents (88.1%) think that surface waters of the Litani River, Qaraoun Lake and their tributaries, are polluted (Figure 4.18).

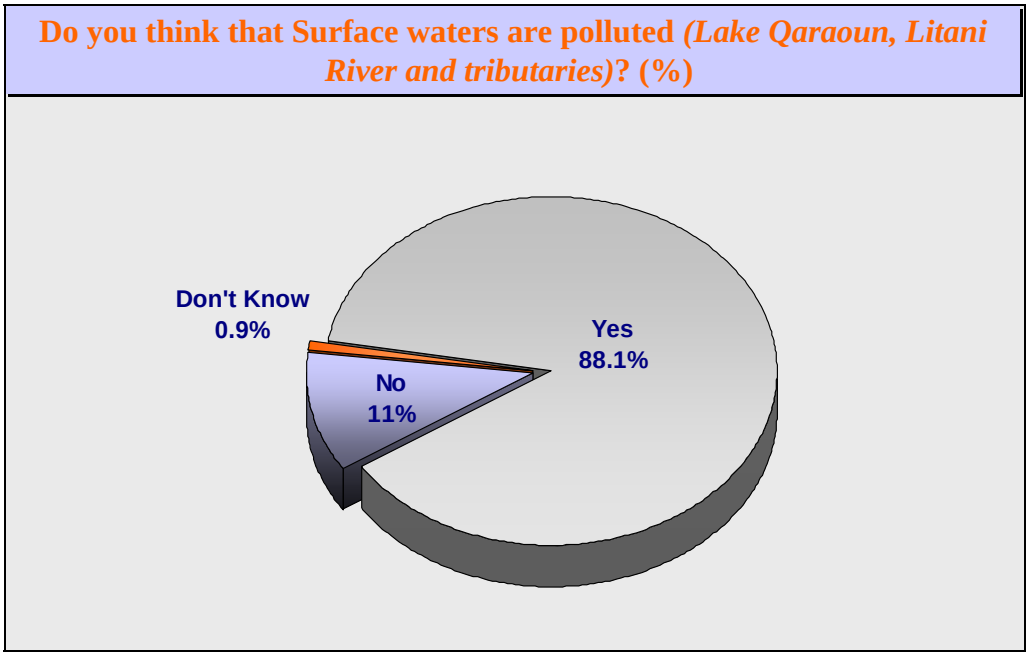

Figure 4.18: Do you think that Surface waters are polluted (Lake Qaraoun, Litani River and tributaries)?

Moreover, 67.3% of those who think surface waters are polluted rated the level of pollution at 'very polluted'. The rates ranged from 1 to 5, with 5 being 'very polluted' and 1 being 'not polluted at all'. This majority was followed by 21.5% who thought it was 'Somewhat polluted' (Figure 4.19).

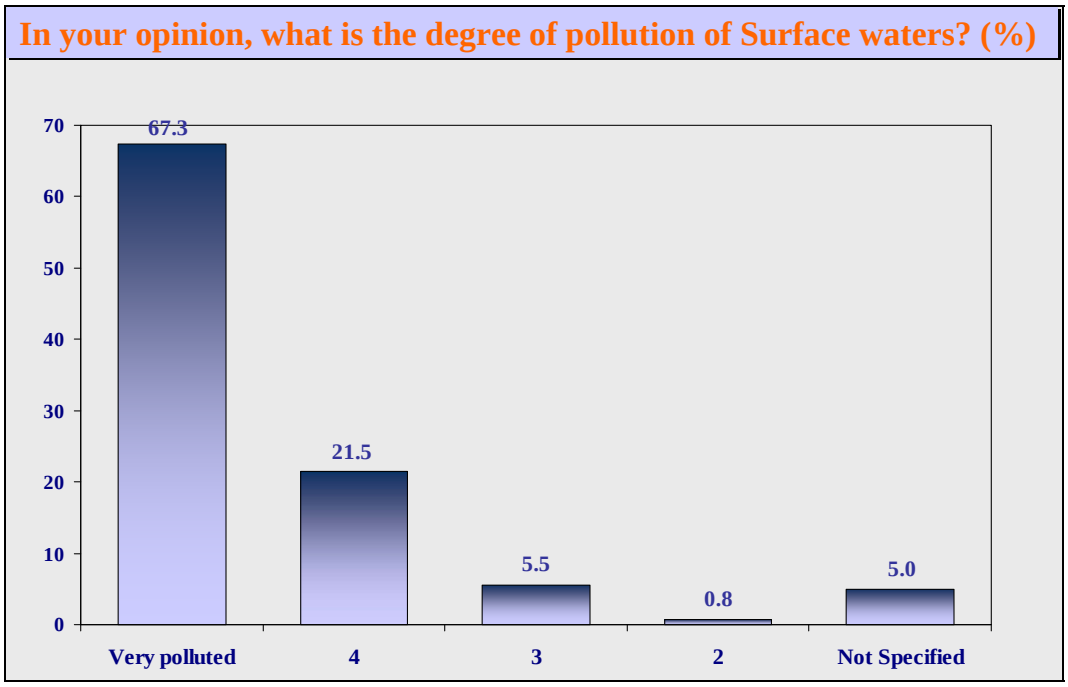

Figure 4.19: In your opinion, what is the degree of pollution of Surface waters?

When asked about the degree of contribution of various causes to this pollution, on a scale 1 to 5, with 1 being 'no contribution at all' and 5 being "very high contribution", sewage (92.8%) scored the highest degree of contribution to surface waters pollution, followed by industrial wastes (73.5%), agricultural wastes (63.9%) and solid wastes (62%) (Table 4.20).

Table 4.20: Degree of Contribution of Various Causes to Surface Waters Pollution

Causes of Pollution	1 (No Contribution at all)	2	3	4	5 (Very High Contribution)	Not specified
Sewage	0.3%	0.6%	1.3%	4%	92.8%	1%
Industrial wastes	5%	5.9%	5.1%	9.5%	73.5%	1%
Solid wastes	2.4%	6.9%	12.4%	15.4%	62%	1%
Agricultural wastes	***2.7%***	***7.7%***	***8.8%***	***15.9%***	***63.9%***	***1%***

Industrial wastes as a cause of surface waters pollution proved to be more prominent in West Bekaa and Zahle than in Baalbeck where only 6.9% of the population attributed to it a 'very high contribution' (Table 4.21).

Table 4.21: Degree of contribution of industrial wastes to surface water pollution by Caza

Degree of Contribution	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1 (No contribution at all)	27	26.5%	1	0.6%	3	0.9%	31	5 %
2	28	27.5%	5	2.8%	4	1.2%	37	5.9%
3	19	18.6%	9	5.1%	4	1.2%	32	5.1%
4	21	20.6%	11	6.2%	27	7.8%	59	9.5%
5 (Very high contribution)	7	6.9%	148	83.6%	303	88.1%	458	73. 5%
Not specified	0	0%	3	1.7%	3	0.9%	6	1%
Total	**102**	**100%**	**177**	**100%**	**344**	**100%**	**623**	**100%**

As for solid waste, it is most prevalent as a source of surface waters pollution in the West Bekaa and Zahle, with 64.4% and 77.9% of each of their residents respectively reporting it to "very highly" contribute to this pollution (Table 4.22).

Table 4.22: Degree of contribution of solid wastes to surface water pollution by Caza

Degree of Contribution	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1 (No contribution at all)	9	8.8%	1	0.6%	5	1.5%	15	2.4%
2	22	21.6%	17	9.6%	4	1.2%	43	6.9%
3	39	38.2%	18	10.2%	20	5.8%	77	12.4%
4	28	27.5%	24	13.6%	44	12.8%	96	15.4%
5 (Very high contribution)	4	3.9%	114	64.4%	268	77.9%	386	62%
Not specified	0	0%	3	1.7%	3	0.9%	6	1%
Total	***102***	***100%***	***177***	***100%***	***344***	***100%***	***623***	***100%***

Agricultural wastes as a cause of surface waters pollution was highlighted in Zahle that showed the most concern with 77.3% of its inhabitants citing it as a 'very high contributor' (Table 4.23).

Table 4.23: Degree of contribution of agricultural wastes to surface water pollution by Caza

Degree of Contribution	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1 (No contribution at all)	1	1%	10	5.6%	6	1.7%	17	2.7%
2	9	8.8%	25	14.1%	14	4.1%	48	7.7%
3	21	20.6%	18	10.2%	16	4.7%	55	8.8%
4	33	32.4%	27	15.3%	39	11.3%	99	15.9%
5 (Very high contribution)	38	37.3%	94	53.1%	266	77.3%	398	63.9%
Not specified	0	0%	3	1.7%	3	0.9%	6	1%
Total	***102***	***100%***	***177***	***100%***	***344***	***100%***	***623***	***100%***

22 respondents (3.1%) reported that other contributors can also have an effect on the quality of the surface water. The main cause specified under "other" sources of pollution was animal farms and dead animals (45.5%). 13.6% mentioned quarries, the leathers industry and the pickles industry respectively. A total list of these factors is shown in Table 4.24.

Table 4.24: Other causes of surface waters pollution:

Other Causes of Surface Waters Pollution	Frequency	Percent
Fishermen	1	4.5%
Animal Farms and dead animals	10	45.5%
Hospital wastes	2	9.1%
Quarries	3	13.6%
Leather industry	3	13.6%
Pickles industry	3	13.6%
Total	***22***	***100%***

4.3.4 GROUNDWATER

A positive 75.7% of the sampled respondents do not think that ground water is polluted (Figure 4.20).

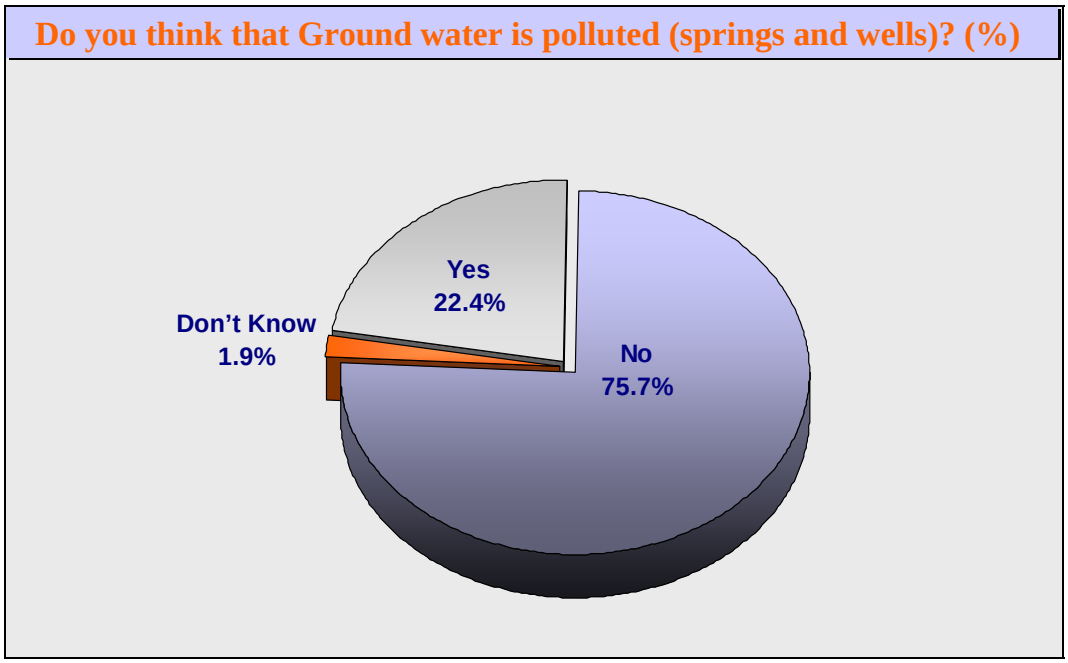

Figure 4.20: Do you think that Ground water is polluted (springs and wells)?

Of the 22.4% who think ground water is polluted, 34.1% of them rank it as "very polluted", while another 32.9% think it's somewhat polluted. The degrees ground water pollution are detailed in Figure 4.21.

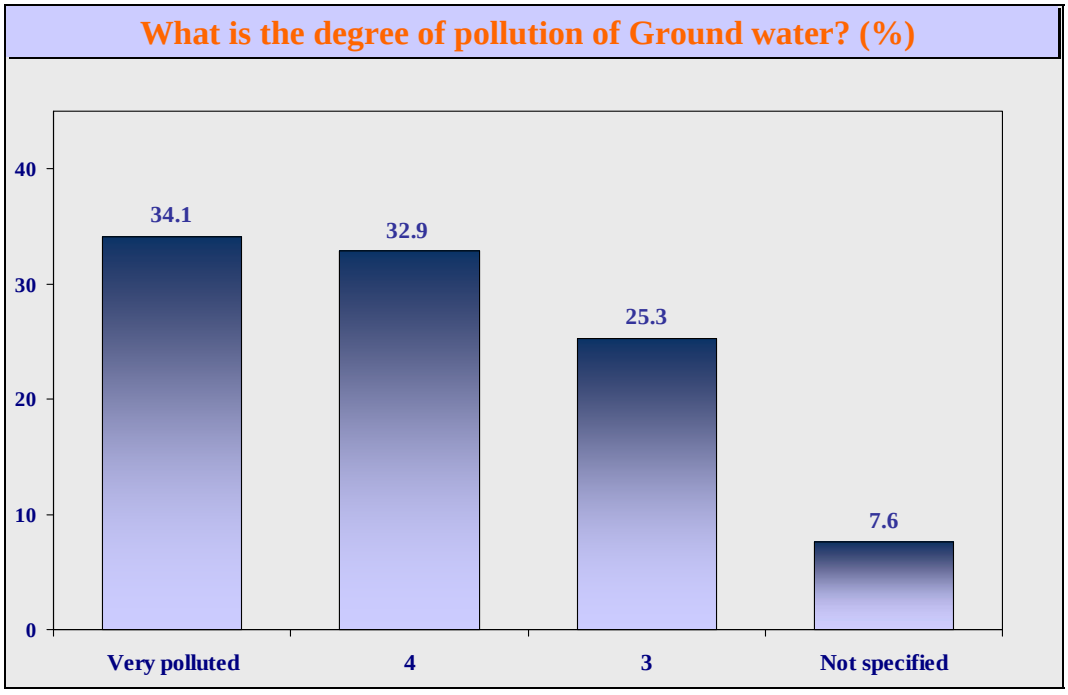

Figure 4.21: Degree of pollution of Ground water

Yet the degree of ground water pollution seems to be substantially less in Baalbeck than in the other Cazas. Only 23.1% and 15.4% of its residents think it is 'polluted' and 'very polluted' respectively. The details of how it compares to other Cazas are presented in Table 4.25.

Table 4.25: Degree of pollution of ground water by Caza

Degree of pollution	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
3	6	46.2%	9	20.5%	28	24.8%	43	25.3%
4	3	23.1%	18	40.9%	35	31%	56	32.9%
5 (Very Polluted)	2	15.4%	14	31.8%	42	37.2%	58	34.1%
Not specified	2	15.4%	3	6.8%	8	7.1%	13	7.6%
Total	***13***	***100%***	***44***	***100%***	***113***	***100%***	***170***	***100%***

When asked about the degree of contribution of various causes to ground water pollution, on a scale 1 to 5, with 1 being 'no contribution at all' and 5 being "very high contribution", sewage (76.5%) scored the highest degree of "very high contribution" to this pollution, followed by industrial wastes (57.6%), solid wastes (47.1%), and agricultural wastes (44.7%)(Table 4.26).

Table 4.26: Degree of Contribution of Various Causes to Surface Waters Pollution

Causes of Pollution	1 (No Contribution at all)	2	3	4	5 (Very High Contribution)	Not specified
Sewage	1.8%	1.8%	2.9%	9.4%	76.5%	7.6%
Industrial wastes	6.5%	4.7%	6.5%	17.1%	57.6%	7.6%
Solid wastes	8.8%	12.4%	15.9%	8.2%	47.1%	7.6%
Agricultural wastes	7.6%	13.5%	15.9%	10.6%	44.7%	7.6%

Table 4.27 explains the extent of this problem in each Caza. While 54.5% of West Bekaa's inhabitants and 65.5% of Zahle's inhabitants think that industrial wastes have a 'very high contribution' to ground water, none of Baalbeck respondents think it is. These results point to the gravity of industrial wastes in the middle and lower streams of the river.

Table 4.27: Degree of contribution of industrial wastes to ground water pollution by Caza

Degree of contribution	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1 (No contribution at all)	1	7.7%	5	11.4%	5	4.4%	11	6.5%
2	2	15.4%	3	6.8%	3	2.7%	8	4.7%
3	3	23.1%	2	4.5%	6	5.3%	11	6.5%
4	5	38.5%	7	15.9%	17	15%	29	17.1%
5 (Very high contribution)	0	0%	24	54.5%	74	65.5%	98	57.6%
Not Specified	2	15.4%	3	6.8%	8	7.1%	13	7.6%
Total	***13***	***100%***	***44***	***100%***	***114***	***100%***	***170***	***100%***

4.5 GARBAGE DISPOSAL

4.5.1. GARBAGE DISPOSAL

The vast majority of the residents in the surveyed towns (96.4%) reported to dispose of their garbage through special tanks where it is then collected by the municipality, while the remaining 2.3% use garbage dumps (Figure 4.22).

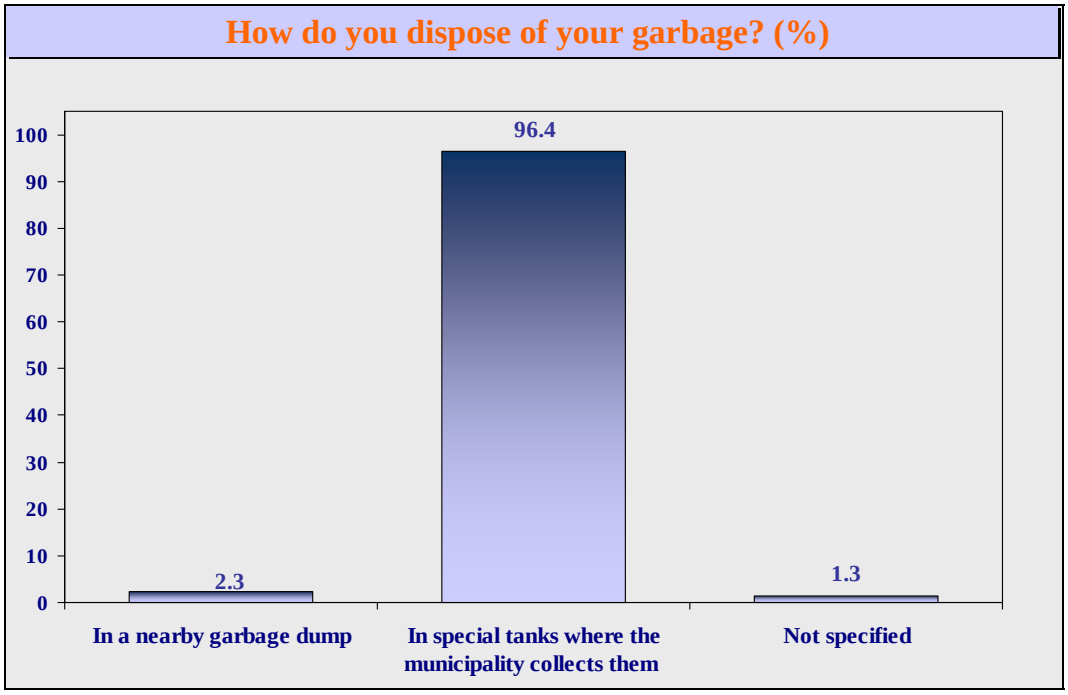

Figure 4.22: How do you dispose of your garbage?

4.6 WILLINGNESS OF RESPONDENTS TO ENGAGE IN PARTICIPATORY WATER SOLVING ISSUES

4.6.1 EFFECT OF ACTIONS ON REDUCING WATER POLLUTION AND WATER WASTAGES

63.1% of surveyed respondents strongly agree that their actions can make a difference in the reduction of water pollution. As shown in Figure 4.23, only 5.9% and 6.7% 'somewhat disagree' and 'strongly disagree' respectively about their role in the reduction of pollution.

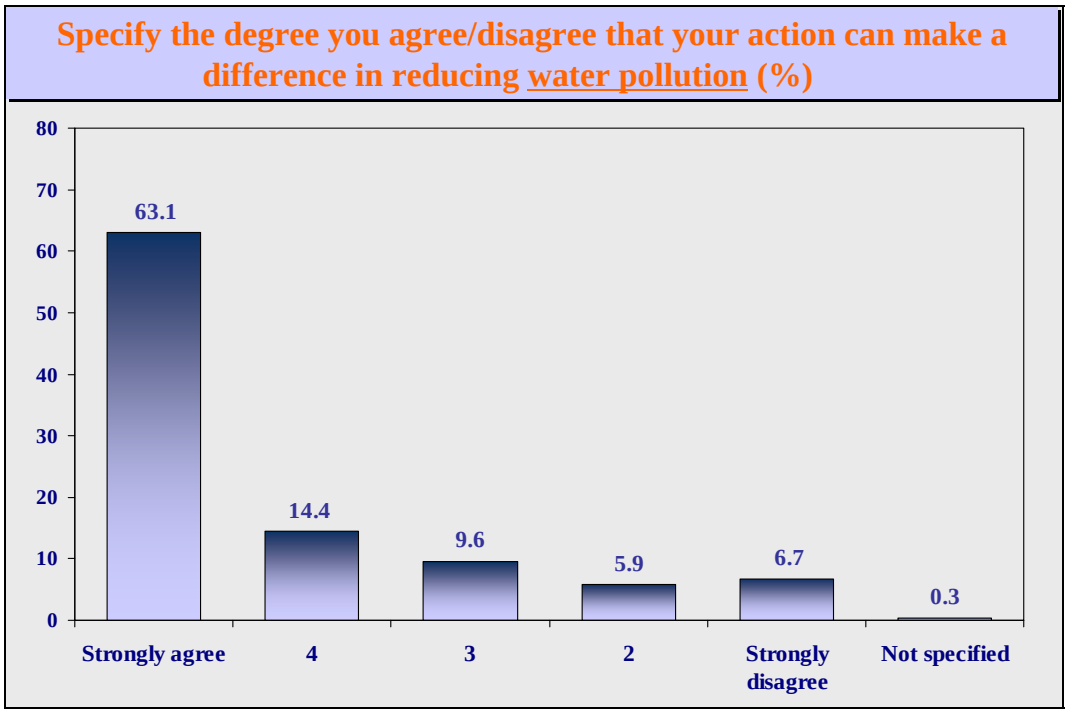

Figure 4.23: Specify the degree you agree/disagree that your action can make a difference in reducing water pollution

For the water wastages, the people's perception of their responsibility towards it is very similar. 65.7% strongly agree that they can make a difference, while only 5.9% and 5.0% 'somewhat disagree' and 'strongly disagree' respectively (Figure 4.24).

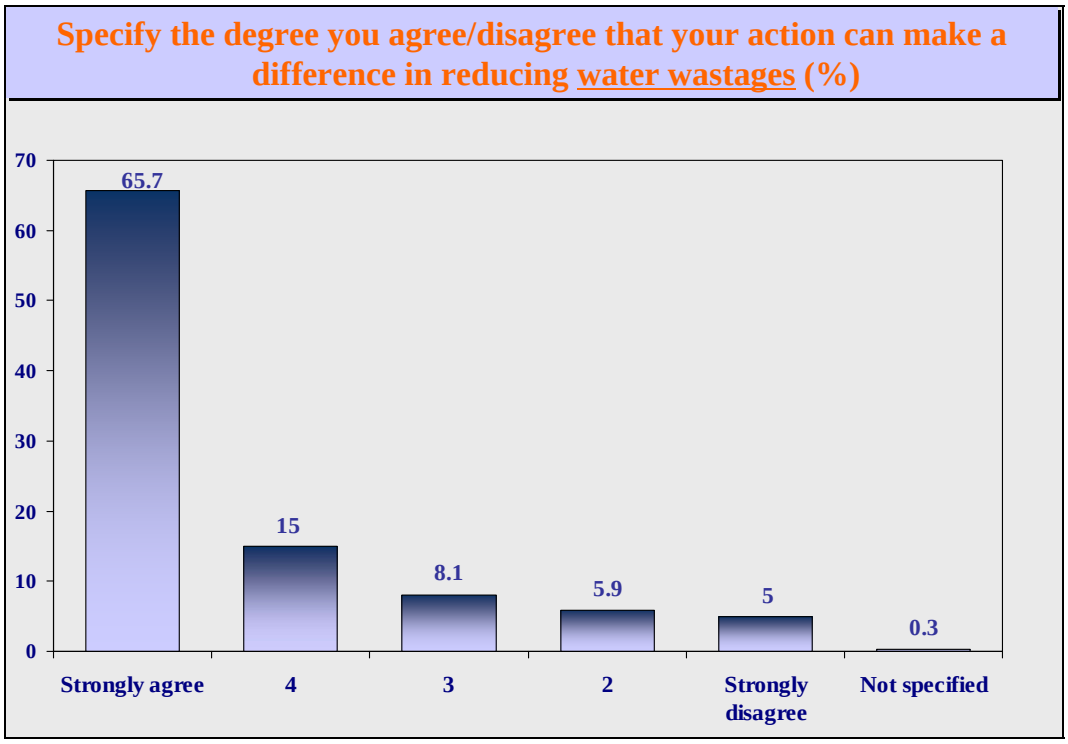

Figure 4.24: Specify the degree you agree/disagree that your action can make a difference in reducing water wastages

4.6.2 POTABLE WATER AND RESIDENTIAL SEWAGE

The remainder of this questionnaire examines the respondents' perceptions about what parties are expected to pay for various water/sewage related services. The related services included potable water supply, treating residential sewage, industrial water supply, treating industrial sewage, irrigation water, and dealing with agricultural pollution.

In regards to potable water supply, 40.4% of the surveyed respondents think that residents should pay for potable water based on their actual use, 29% think it should be the central government through citizen taxes and another 27.3% reported it should be on residents based on a flat fee (Figure 4.25).

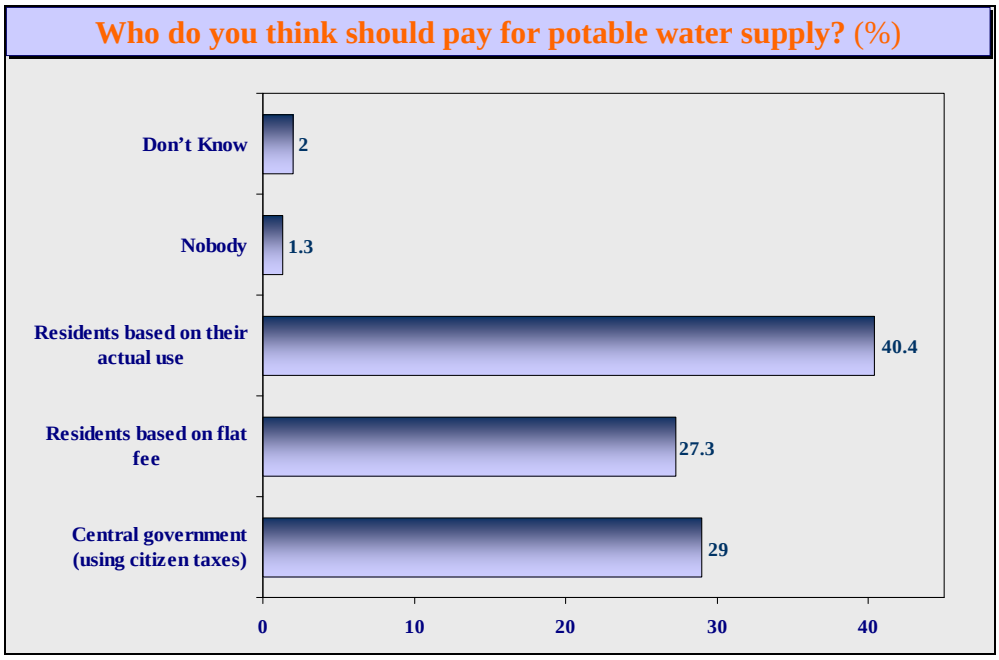

Figure 4.25: Who do you think should pay for potable water supply?

In the case of treating residential sewage, the majority of respondents are also for the government and the residents paying for it (46.3% and 32.9% respectively). Resident's pay was here in favor of flat fees rather than being based on actual use (Figure 4.26).

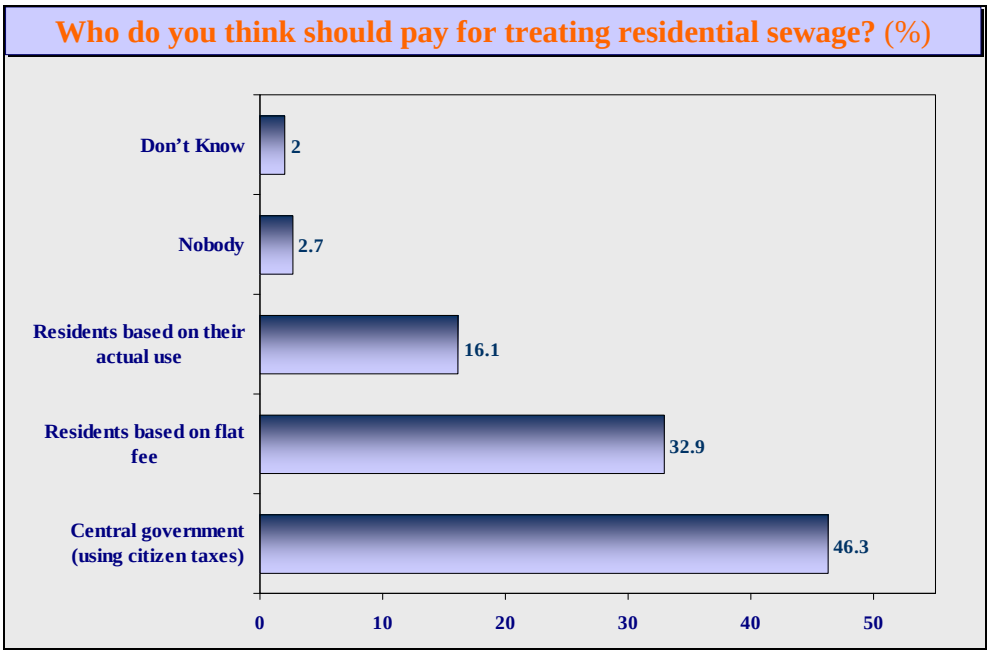

Figure 4.26: Who do you think should pay for treating residential sewage?

4.6.3 INDUSTRIAL WATER AND INDUSTRIAL SEWAGE

The attitude is similar for industrial water supplies. They should either be paid for by the government or the industries themselves. As Figure 4.27 shows, most believe that industries should pay for them based on actual use (43.9%).

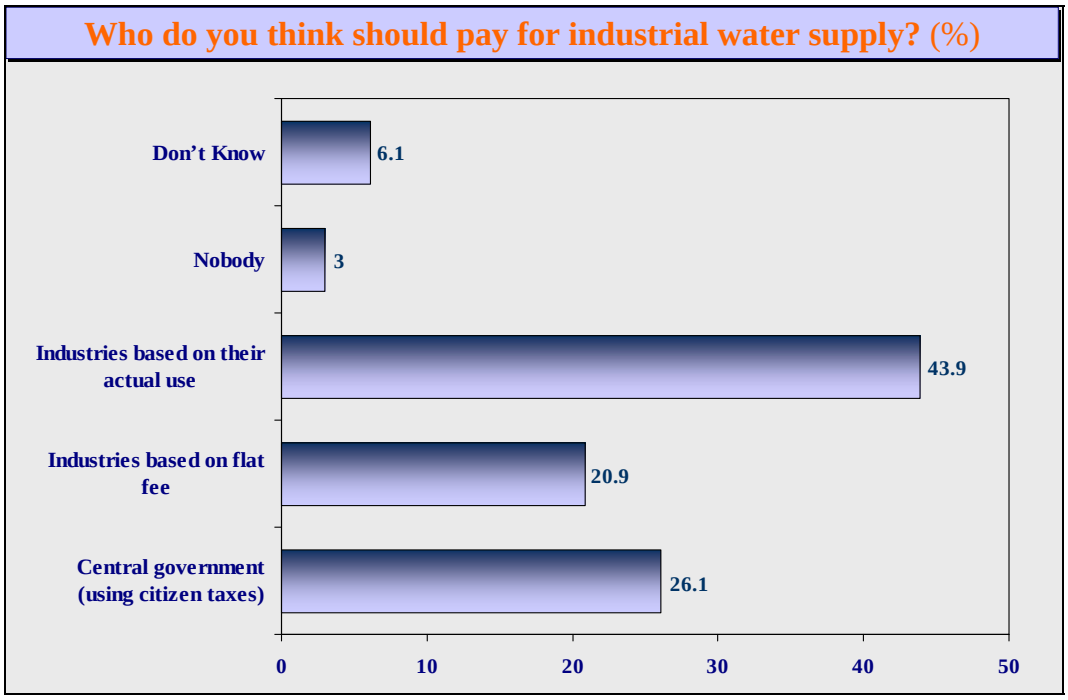

Figure 4.27: Who do you think should pay for industrial water supply?

In Baalbeck, residents asked more of the government, with 47.6% asking that it pays for industrial water supply. In Zahle, this is more expected of the industries themselves, where 54.5% of residents call on them to do this based on their actual use. This is elaborated on in Table 4.28.

Table 4.28: Who should pay for industrial water supply? By Cazas

Who should pay for industrial water supply?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Central Government using citizen taxes	49	47.6%	54	26.5%	80	20.4%	183	26.1%
Industries based on flat fee	32	31.1%	40	19.6%	74	18.8%	146	20.9%
Industries based on their actual use	16	15.5%	77	37.7%	214	54.5%	307	43.9%
Nobody	1	1%	13	6.4%	7	1.8%	21	3%
Don't know	5	4.9%	20	9.8%	18	4.6%	43	6.1%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

Consequently, the treatment of industrial sewage was also distributed among the government and the industries themselves, but with the most emphasis placed on the government. Figure 4.28 demonstrates that 35.9% of surveyed respondents think it should be the government.

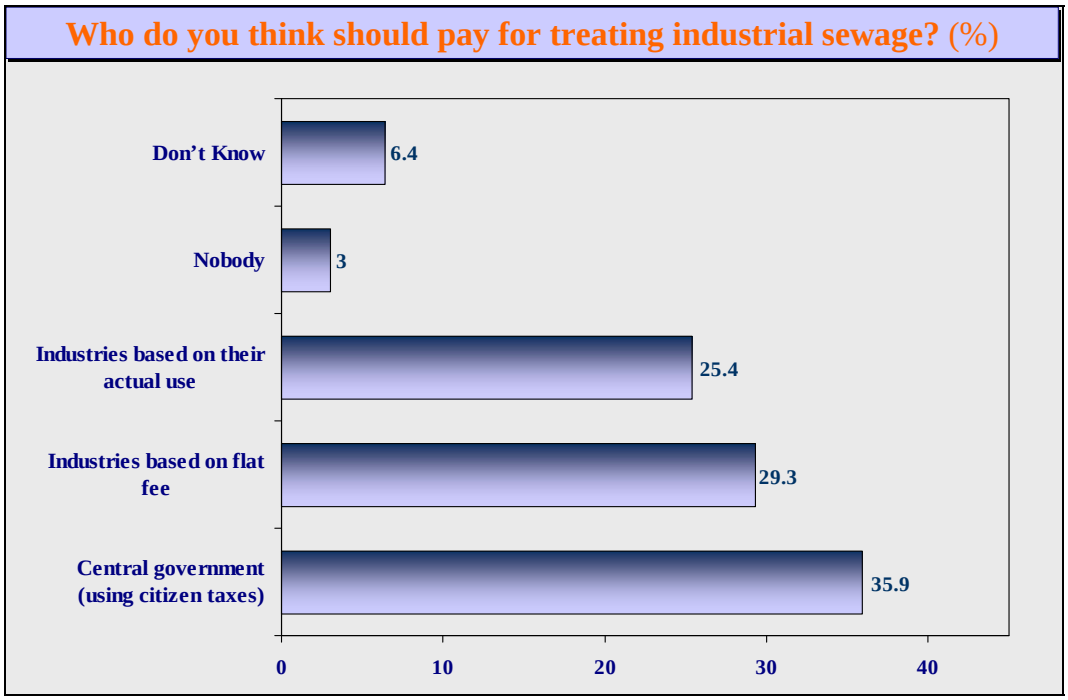

Figure 4.28: Who do you think should pay for treating industrial sewage?

4.6.4 IRRIGATION WATER AND AGRICULTURAL POLLUTION

Finally, water for agricultural use should be paid for by the farmers' themselves or the government using citizens' taxes. 46.7% believe the farmers should pay based on their actual use, and 16.4% think it should be a flat fee (Figure 4.29).

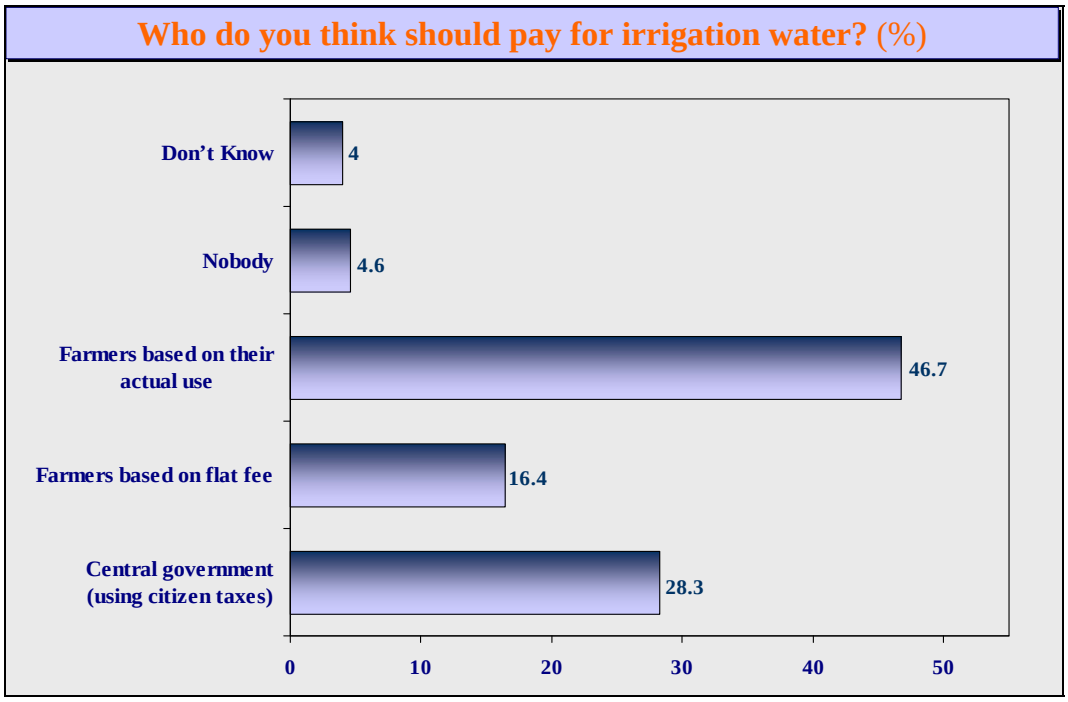

Figure 4.29: Who do you think should pay for irrigation water?

While the majority of respondents answered that it is the farmers who should be paying for this water, in Baalbeck, more emphasis is placed on the government using citizens taxes. Table 4.29 shows that 49.5% of its residents ascribe this responsibility to the government. This number decreases to 24% and 24.9% in West Bekaa and Zahle.

Table 4.29: Who should pay for irrigation water? By Caza

Who should pay for irrigation water?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Central Government using citizen taxes	51	49.5%	49	24%	98	24.9%	198	28.3%
Farmers based on flat fee	5	4.9%	45	22.1%	65	16.5%	115	16.4%
Farmers based on their actual use	41	39.8%	92	45.1%	194	49.4%	327	46.7%
Nobody	1	1%	10	4.9%	21	5.3%	32	4.6%
Don't know	5	4.9%	8	3.9%	15	3.8%	28	4%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

However as in the cases above, it was mostly the government who is thought to be responsible for dealing with agricultural pollution. Figure 4.30 shows that 41.6% believe that the central government should do it, using citizen taxes.

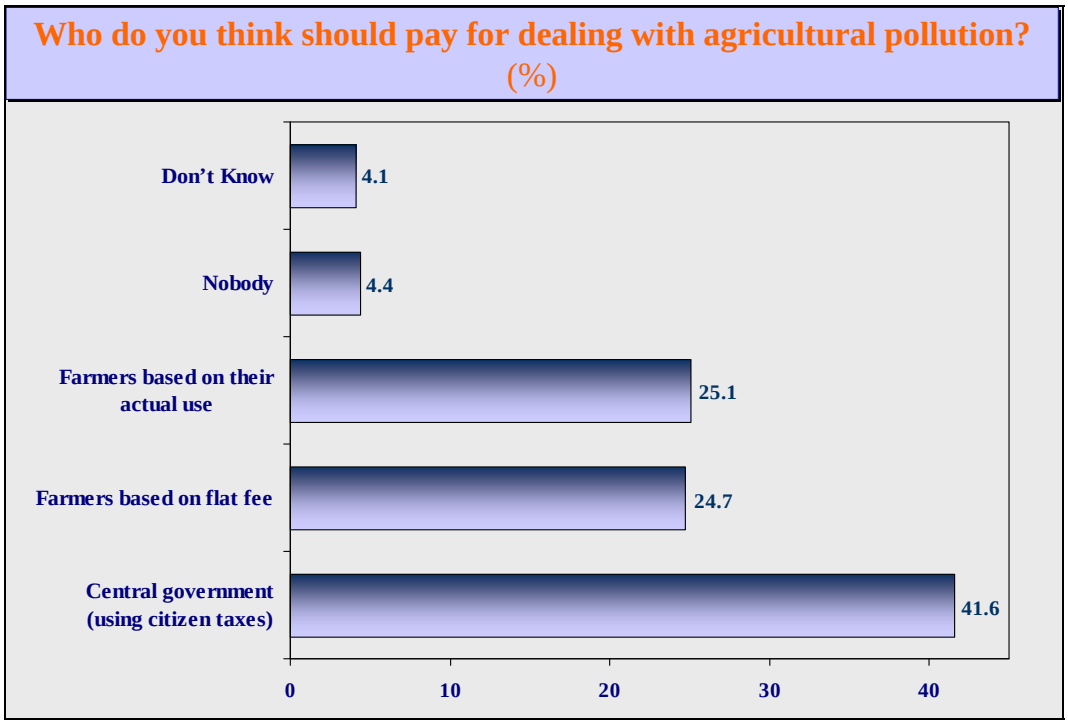

Figure 4.30: Who do you think should pay for dealing with agricultural pollution?

4.7 PUBLIC PERCEPTIONS OF GOVERNMENT OR OTHER AGENCIES' RESPONSIBILITY IN VARIOUS WATER MANAGEMENT FUNCTIONS

4.7.1 DRINKING WATER

The majority of water resource management in the area of interest is, according to the residents, supplied by public agencies; the Ministry of Energy and Water, a regional water establishment, or the municipalities. Their extent of involvement however differs with every task.

For the supply of drinking water, 37.7% said that it is the regional water establishment that is providing it, and 28% said that it was the municipality who was providing it. Only 19.7% said it was the Ministry of Energy and Water.

Interestingly enough, this percentage increased when people were asked who should be providing drinking water. 36.4% said the ministry should be doing it, 23% for the MOEW while the percent decreased for the regional water establishment as shown in Figure 4.31.

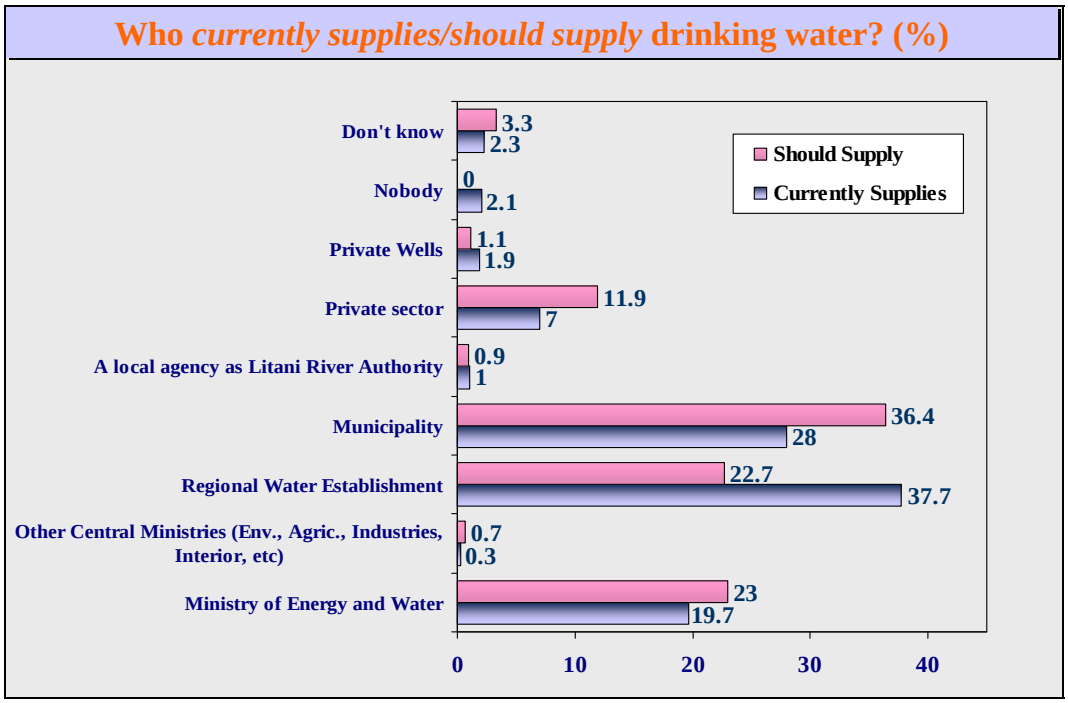

Figure 4.31: Who currently supplies/should supply drinking water?

What is noteworthy is that the responsibility of supplying drinking water is skewed more towards the municipality in Baalbeck (86.4%), whereas in the other regions, the task of supplying water is more evenly spread out between public agencies and the private sector (Table 4.30).

Table 4.30: Who should supply drinking water? By Caza

Who should supply drinking water?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
MOEW	3	2.9%	45	22.1%	113	28.8%	161	23%
Other central ministries	0	0%	2	1%	3	0.8%	5	0.7%
Regional water establishment	10	9.7%	54	26.5%	95	24. 2%	159	22.7%
Municipality	89	86.4%	81	39.7%	85	21.6%	255	36.4%
Litani Authority	0	0%	3	1.5%	3	0.8%	6	0.9%
Private Sector	0	0%	7	3.4%	76	19.3%	83	11.9%
Private Wells	0	0%	2	1%	6	1.5%	8	1.1%
Don't know	1	1%	10	4.9%	12	3.1%	23	3.3%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

4.7.2 TREATING WASTEWATER

71.9% of respondents reported that their municipality is currently taking care of treating wastewater. Percentages drop drastically for other agencies and reach 8.6% for the Ministry of Energy and Water and 2.9% for "other central ministries".

The percentages differed when it came to who should be assuming this responsibility. 10.7% of respondents said the Ministry of Energy and Water should do it, and 12.4% said other ministries should do it. Likewise, the percentage for the municipalities' duty regarding treating wastewater decreases to 63% (Figure 4.32).

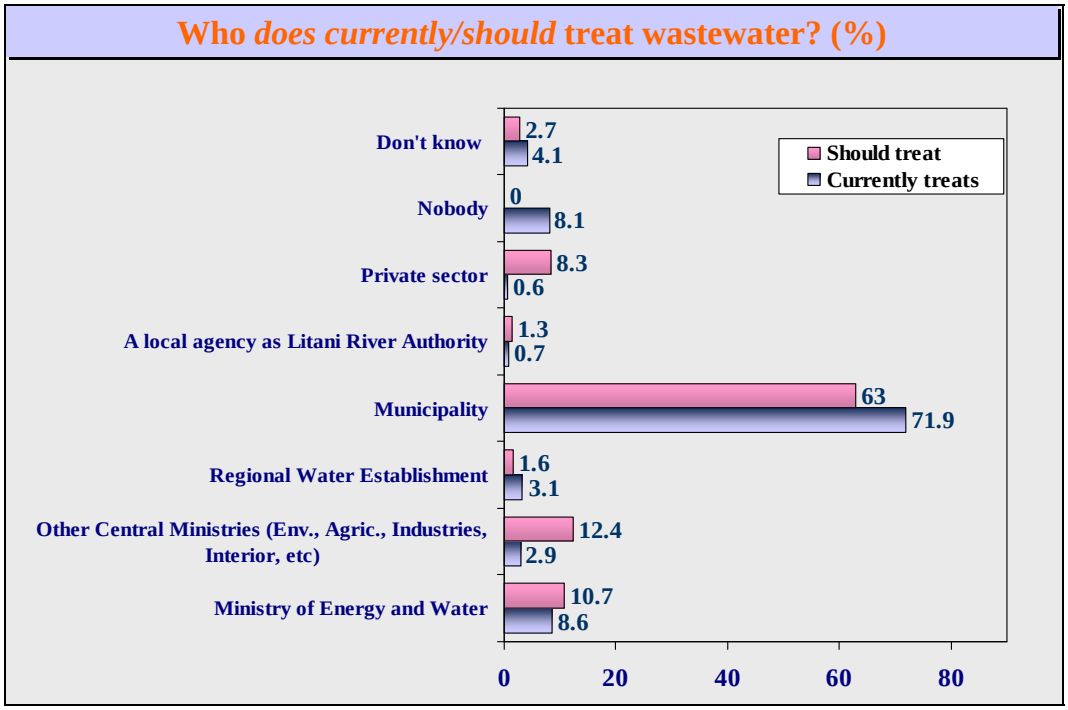

Figure 4.32: Who does currently treat/should treat wastewater?

Table 4.31 shows that in Baalbeck, there is a bigger strain on the municipality to fulfill the task of treating wastewater, with 84.5% of its residents assigning to it this responsibility. On the other hand, in West Bekaa and Zahle, a shared responsibility is assigned between the municipality, the ministry and other central ministries. The private sector is highlighted in Zahle (14.2%) as a main key player that should be responsible for treating waste water, while it was almost absent in the other two cazas.

Table 4.31: Who should treat wastewater? By Caza

Who treats wastewater?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
MOEW	6	5.8%	18	8.8%	51	13%	75	10.7%
Other central ministries	1	1%	39	19.1%	47	12%	87	12.4%
Regional water establishment	5	4.9%	2	1%	4	1%	11	1.6%
Municipality	87	84.5%	126	61.8%	22	58%	441	63%
Litani Authority	3	2.9%	5	2.5%	1	0.3%	9	1.3%
Private Sector	0	0%	2	1%	5	14.2%	58	8.3%
Don't know	1	1%	12	5.9%	6	1.5%	19	2.7%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

4.7.3 MEASURING WATER RESOURCES (SURFACE AND GROUNDWATER)

The measurement of water resources is not performed as clearly as other tasks, with 20.7% of respondents reporting that 'nobody' is currently measuring the water resources, and another 20.7% saying they do not know who is performing this task.

36.6% of the surveyed respondents however believed that the MOEW should be conducting these measurements, and 27.9% said the municipality should do it (Figure 4.33).

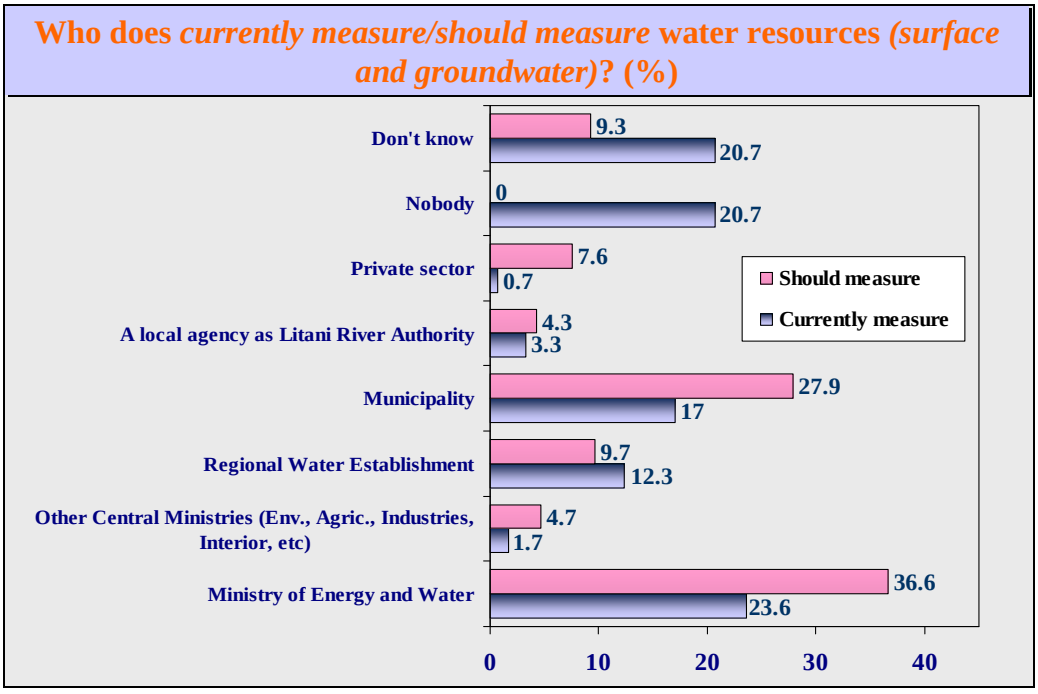

Figure 4.33: Who does currently measure/should measure water resources (surface and groundwater)?

A good percentage of female respondents did not know who currently measures water resources (28.6%). Moreover, male respondents assigned it to the ministry and municipality more than the women did, with 28.8% naming the first, and 18% naming the municipality (Table 4.32).

Table 4.32: Who measures water resources? By gender

Who measures water resources?	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
MOEW	109	28.8%	56	17.4%	165	23.6%
Other central ministries	6	1.6%	6	1.9%	12	1.7%
Regional water establishment	44	11.6%	42	13%	86	12.3%
Municipality	68	18%	51	15.8%	119	17%
Litani Authority	12	3.2%	11	3.4%	23	3.3%
Private Sector	4	1.1%	1	0.3%	5	0.7%
Nobody	82	21.7%	63	19.6%	145	20.7%
Don't know	53	14%	92	28.6%	145	20.7%
Total	***378***	***100%***	***322***	***100%***	***700***	***100%***

In accordance with Graph 34, Tables 33 and 34 list the differences in the provision of this service between the Cazas as well as the people's perceptions of who should be providing it.

The regional water establishment is the party that measures water resources in Baalbeck according to 58.3% of its residents. In West Bekaa and Zahle, this task is shared by different agencies, but 23.5% and 24.2% of residents respectively believe that no one is currently measuring these resources (Table 4.33).

Table 4.33: Who currently measures water resources? By Caza

Who measures water resources?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
MOEW	24	23.3%	36	17.6%	105	26.7%	165	23.6%
Other central ministries	2	1.9%	6	2.9%	4	1%	12	1.7%
Regional water establishment	60	58.3%	4	2%	22	5.6%	86	12.3%
Municipality	3	2.9%	40	19.6%	76	19.3%	119	17%
Litani Authority	3	2.9%	17	8.3%	3	0.8%	23	3.3%
Private Sector	0	0%	2	1%	3	0.8%	5	0.7%
Nobody	2	1.9%	48	23.5%	95	24.2%	145	20.7%
Don't know	9	8.7%	51	25%	85	21.6%	145	20.7%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

These numbers change when it comes to people's perceptions about who should be making those measurements. The residents of Baalbeck feel that the regional water establishment and the municipality can fulfill this capacity (36.9% and 43.7% respectively). In West Bekaa and Zahle, it is mainly the Ministry of Energy and Water and the municipality (Table 4.34).

Table 4.34: Who should measure water resources? By Caza

Who should measure water resources?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
MOEW	15	14.6%	61	29.9%	180	45.8%	256	36.6%
Other central ministries	2	1.9%	17	8.3%	14	3.6%	33	4.7%
Regional water establishment	38	36.9%	4	2%	26	6.6%	68	9.7%
Municipality	45	43.7%	60	29.4%	90	22.9%	195	27.9%
Litani Authority	0	0%	20	9.8%	10	2.5%	30	4.3%
Private Sector	0	0%	5	2.5%	48	12.2%	53	7.6%
Don't know	3	2.9%	37	18.1%	25	6.4%	65	9.3%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

4.7.4 AWARDING AND MONITORING WITHDRAWAL AUTHORIZATIONS

The Ministry of Energy and Water and the municipalities' performance in awarding and monitoring withdrawal authorizations (from springs and wells) is undermined. Only 39.7% and 21.6% of respondents reported respectively that these two parties currently undertake this responsibility.

However, when asked who should be awarding and monitoring withdrawal authorizations, 45.1% of respondents listed the MOEW, and 25.1% said it is the municipality who should be in charge of this issue. The details are presented in Figure 4.34.

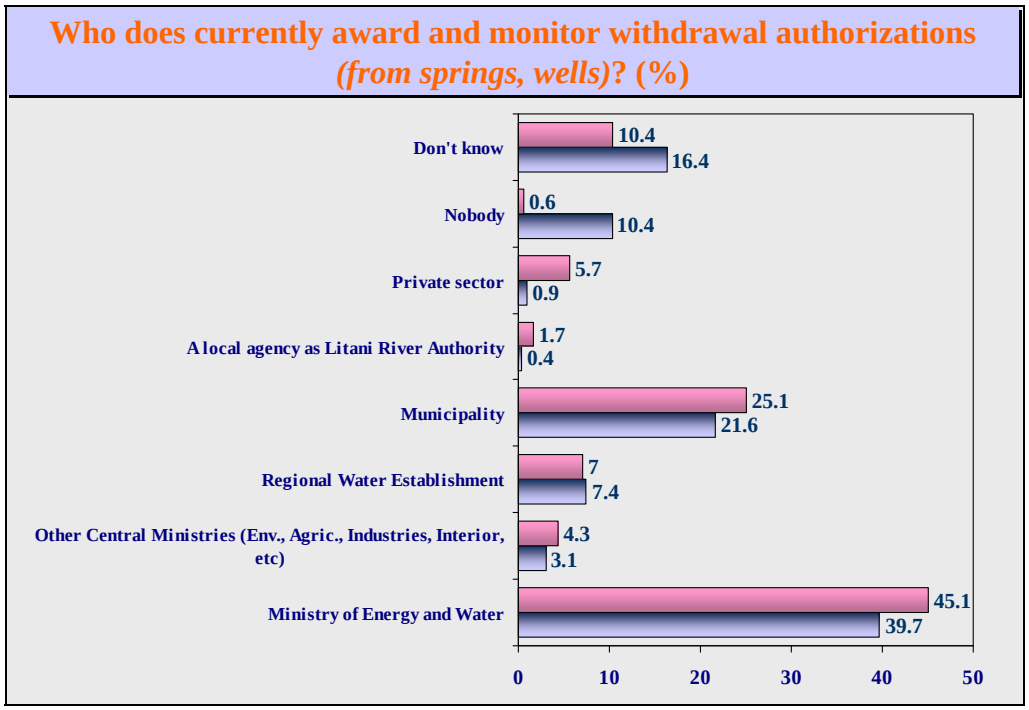

Figure 4.34: Who does currently/should award and monitor withdrawal authorizations (from springs, wells)?

While the Ministry of Energy and Water does a considerable amount of this work, it is in Baalbeck where it is reported to be most active (64.1%). In West Bekaa, this issue is rather split between the ministry and the municipality with the former doing 23.5% of the work and the latter doing 33.8% of it (Table 4.34).

Table 4.35: Who awards and monitors withdrawal authorizations? By Caza

Who awards and monitors authorizations?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
MOEW	66	64.1%	48	23.5%	164	41.7%	278	39.7%
Other central ministries	0	0%	10	4.9%	12	3.1%	22	3.1%
Regional water establishment	18	17.5%	6	2.9%	28	7.1%	52	7.4%
Municipality	7	6.8%	69	33.8%	75	19.1%	151	21.6%
Litani Authority	1	1%	1	0.5%	1	0.3%	3	0.4%
Private Sector	0	0%	2	1%	4	1%	6	0.9%
Nobody	5	4.9%	25	12.3%	43	10.9%	73	10.4%
Don't know	6	5.8%	43	21.1%	66	16.8%	115	16.4%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

But as Table 4.36 shows, Zahle residents have a lesser inclination to ascribe this task to their municipality as only 18.3% of them did so.

Table 4.36: Who should award and monitor withdrawal authorizations? By Cazas

Who should award and monitor authorizations?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
MOEW	47	45.6%	79	38.7%	190	48.3%	316	45.1%
Other central ministries	0	0%	18	8.8%	12	3.1%	30	4.3%
Regional water establishment	15	14.6%	7	3.4%	27	6.9%	49	7%
Municipality	35	34%	69	33.8%	72	18.3%	176	25.1%
Litani Authority	3	2.9%	2	1%	7	1.8%	12	1.7%
Private Sector	1	1%	2	1%	37	9.4%	40	5.7%
Nobody	0	0%	2	1%	2	0.5%	4	0.6%
Don't know	2	1.9%	25	12.3%	46	11.7%	73	10.4%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

More females wanted the Ministry of Energy and Water to award and monitor these authorizations with 50.9% citing the ministry as the party who should undertake such mission (Table 4.37).

Table 4.37: Who should award and monitor withdrawal authorizations? By gender

Who should award and monitor withdrawal authorizations?	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
MOEW	152	40.2%	164	50.9%	316	45.1%
Other central ministries	21	5.6%	9	2.8%	30	4.3%
Regional water establishment	28	7.4%	21	6.5%	49	7%
Municipality	104	27.5%	72	22.4%	176	25.1%
Litani Authority	5	1.3%	7	2.2%	12	1.7%
Private Sector	25	6.6%	15	4.7%	40	5.7%
Nobody	4	1.1%	0	0%	4	0.6%
Don't know	39	10.3%	34	10.6%	73	10.4%
Total	378	100%	322	100%	700	100%

4.7.5 AWARDING AND MONITORING WASTE WATER RELEASES

Discrepancies were also reported for the awarding and monitoring of waste water releases. Figure 4.36 shows that 32.4% and 37% of respondents reported that the MOEW and the municipalities are currently doing it respectively.

On the other hand, 39.1% of respondents said the MOEW should be doing it and another 34.3% said the municipality should undertake awarding and monitoring waste water.

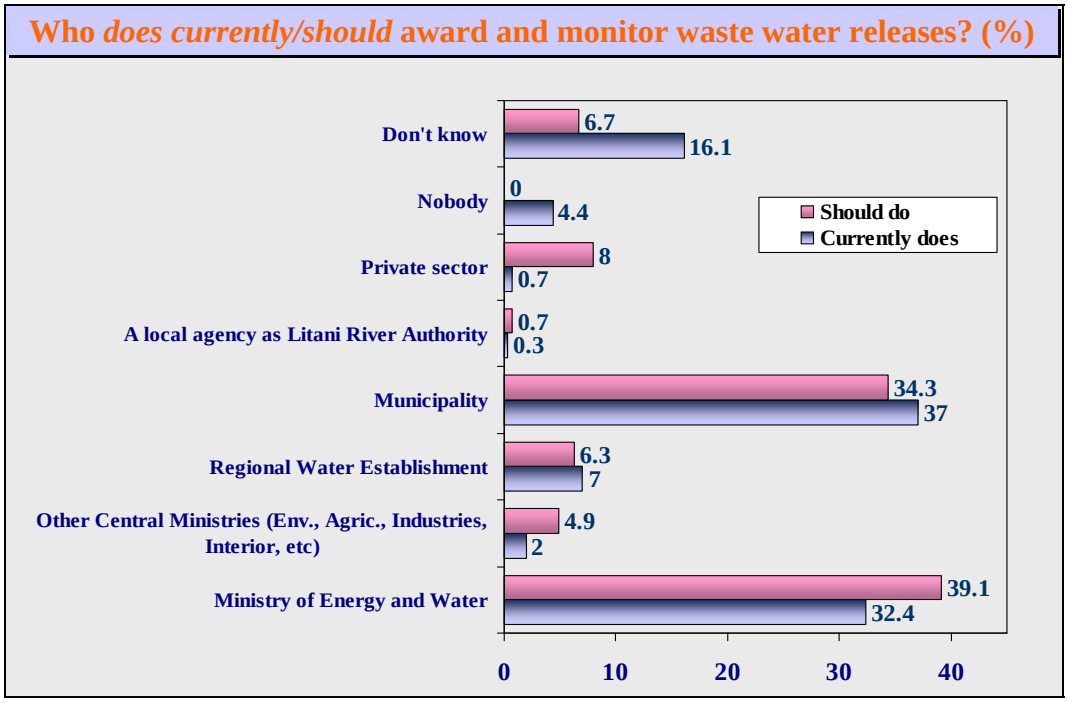

Figure 4.35: Who does currently/should award and monitor waste water releases?

In Baalbeck, this issue was reported to be more the work of the MOEW than the municipality, as Table 4.38 shows that 69.9% of residents take for granted that it is done by the ministry. Only 29.8% and 18.6% of Zahle and West Bekaa residents listed the MOEW as the main current undertaker of awarding and monitoring waste water releases.

Table 4.38: Who awards and monitors waste water release? By Caza

Who monitors waste water release?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
MOEW	72	69.9%	38	18.6%	117	29.8%	227	32.4%
Other central ministries	1	1%	6	2.9%	7	1.8%	14	2%
Regional water establishment	10	9.7%	9	4.4%	30	7.6%	49	7%
Municipality	12	11.7%	94	46.1%	153	38.9%	259	37%
Litani Authority	0	0%	2	1%	0	0%	2	0.3%
Private Sector	0	0%	3	1.5%	2	0.5%	5	0.7%
Nobody	2	1.9%	14	6.9%	15	3.8%	31	4.4%
Don't know	6	5.8%	38	18.6%	69	17.6%	113	16.1%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

4.7.6 SUPPLYING IRRIGATION WATER

The supply of irrigation water, like the measurement of water resources, is performed by different agencies. Here the MOEW's role is diminished (7.9%) and 13.7% of respondents reported that nobody is currently doing this task.

The majority believe that it is the municipality that should be doing this (39.6%) and 13.6% believe it should be the Litani River Authority (Figure 4.36).

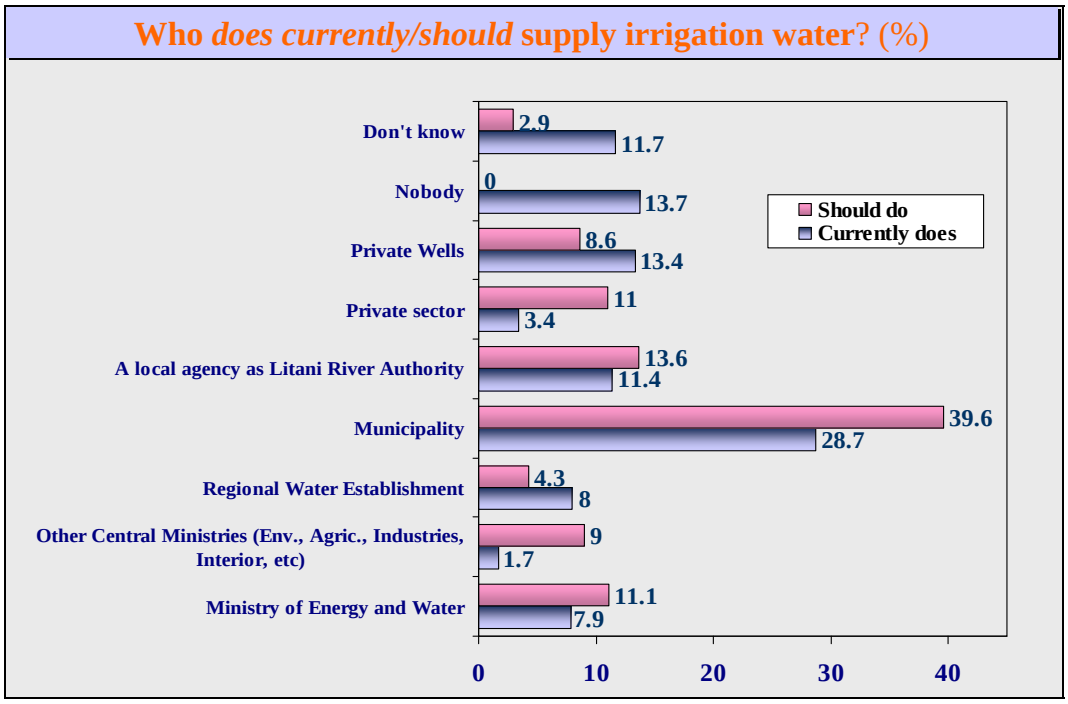

Figure 4.36: Who does currently/should supply irrigation water?

There is a substantial pressure on the municipality of Baalbeck to be supplying this irrigation water as 81.6% of its residents believe it should. This compares with much lower numbers of 33.3% and 31.8% in West Bekaa and Zahle. Interesting enough is that 16.3% of Zahle residents assigned this task to the private sector compared to only 6.4% in West Bekaa and 0% in Baalbeck (Table 4.39).

Table 4.39: Who should supply irrigation water? By Caza

Who should supply irrigation water?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
MOEW	2	1.9%	21	10.3%	55	14%	78	11.1%
Other central ministries	0	0%	12	5.9%	51	13%	63	9%
Regional water establishment	13	12.6%	9	4.4%	8	2%	30	4.3%
Municipality	84	81.6%	68	33.3%	125	31.8%	277	39.6%
Litani Authority	2	1.9%	56	27.5%	37	9.4%	95	13.6%
Private Sector	0	0%	13	6.4%	64	16.3%	77	11%
Private Wells	0	0%	20	9.8%	40	10.2%	60	8.6%
Don't know	2	1.9%	5	2.5%	13	3.3%	20	2.9%
Total	***103***	***100%***	***204***	***100%***	***393***	***100%***	***700***	***100%***

4.7.7 INFORMING THE PUBLIC ABOUT WATER RELEVANT ISSUES

Interesting enough, 52.3% of respondents reported that nobody is currently informing them about water relevant issues. However, 46.3% of the surveyed population said the municipality should be the one to conduct this task (Figure 4.37).

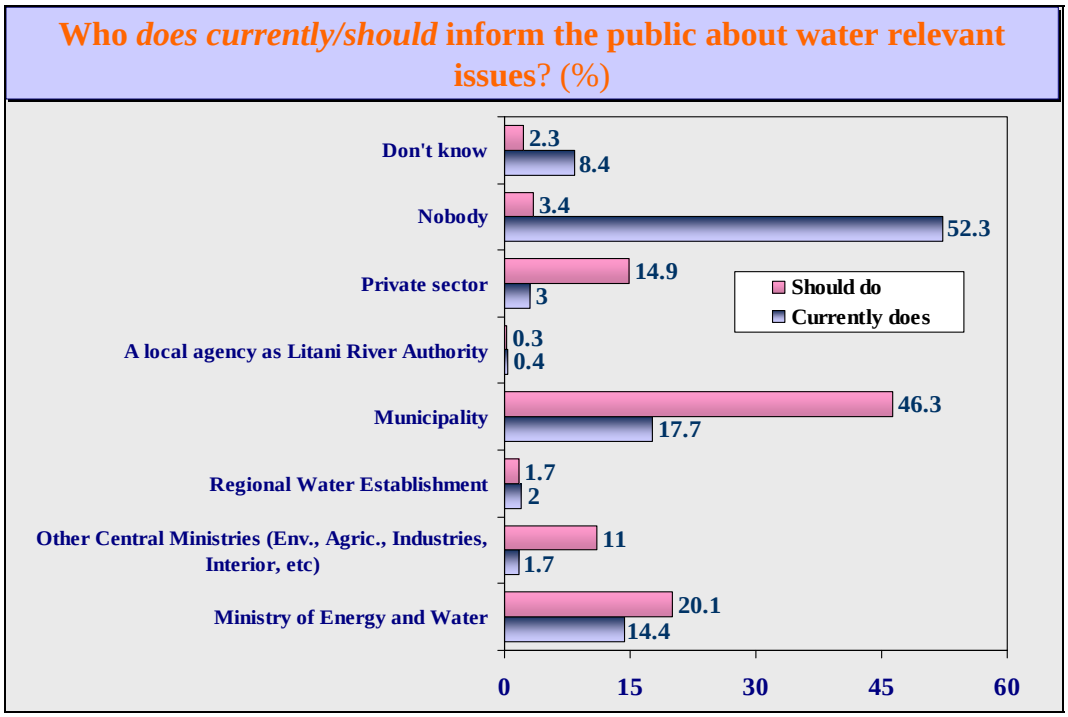

Figure 4.37: Who does currently/should inform the public about water relevant issues?

Table 4.40 shows that the dissemination of information about water relevant issues could have been more accessible to men. A higher percentage of women said that no one informs the public (56.2%), while more men said that the MOEW completes this task (17.2%).

Table 4.40: Who informs the public of water-related issues? By gender

Who informs the public of water-related issues?	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
MOEW	65	17.2%	36	11.2%	101	14.4%
Other central ministries	8	2.1%	4	1.2%	12	1.7%
Regional water establishment	7	1.9%	7	2.2%	14	2%
Municipality	69	18.3%	55	17.1%	124	17.7%
Litani Authority	3	0.8%	0	0%	3	0.4%
Private Sector	14	3.7%	7	2.2%	21	3%
Nobody	185	48.9%	181	56.2%	366	52.3%
Don't know	27	7.1%	32	9.9%	59	8.4%
Total	***378***	***100%***	***322***	***100%***	***700***	***100%***

As in the previous case of supplying irrigation water, Baalbeck residents still placed the most burdens on their municipality. 91.3% of respondents in Baalbeck feel that the municipality should inform the public of water-related issues, whereas 42.6% and 36.4% of those in West Bekaa and Zahle ascribe this to their municipalities (Table 4.41).

Table 4.41: Who should inform the public about water-relevant issues? By Caza

Who should inform the public about water-relevant issues?	Cazas						Total	
	Baalbeck		West Bekaa		Zahle			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
MOEW	2	1.9%	54	26.5 %	85	21.6%	141	20.1%
Other central ministries	0	0%	23	11.3 %	54	13.7%	77	11%
Regional water establishment	5	4.9%	4	2%	3	0.8%	12	1.7%
Municipality	94	91.3 %	87	42.6 %	143	36.4%	324	46.3%
Litani Authority	0	0%	1	0.5%	1	0.3%	2	0.3%
Private Sector	1	1%	14	6.9%	89	22.6%	104	14.9%
Private Wells	0	0%	18	8.8%	6	1.5%	24	3.5%
Don't know	1	1%	3	1.5%	12	3.1%	16	2.3%
Total	***103***	***100 %***	***204***	***100%***	***393***	***100%***	***700***	***100%***

APPENDICES

QUESTIONNAIRE

- Town: _____ Name of Field Worker:_____ Date of Interview: ___/5/2012

1. In your opinion, what is the largest (volume) use of water in the Bekaa? (Please rank the top three priorities):
1. _____ 2. _____ 3. _____

2. Did you see the billboards about water pollution that were posted recently on the roads?
1. Yes 2. No (*Move to question 9*)

3. If Yes, did you like them? 1. Yes 2. No
a. If you liked the posters, please tell me what you liked about them:
1. Drawing 2. Slogan 3. Message conveyed 4. Color 5. Other, _____

b. If you did not like them, please specify what you did not like about the posters?
1. Drawing 2. Slogan 3. Message conveyed 4. Color 5. Other, _____

4. In your opinion, what is the main message that was conveyed through those posters?
_____

5. Do you agree or disagree with the main message conveyed? 1. Agree 2. Disagree

6. How did these billboards make you feel?
1. Sad 2. Angry 3. Worried 4. Happy 5. Nothing 6. Other __

7. Did those posters make you change some of your behaviors regarding waste discharge?
1. Yes 2. No (*Move to question 9)*

8. If Yes, please specify how did your behavior change because of the posters?
_____

9. On a scale of 1-5, where 5 is Very Effective and 1 is Not Effective at all, in your opinion, what is the degree of effectiveness of each of the following methods in conveying a message to the public?

Method	Very Effective				Not effective at all
1. TV Documentaries	5	4	3	2	1
2. Meetings at municipalities	5	4	3	2	1
3. Radio ads	5	4	3	2	1
4. Billboards campaigns	5	4	3	2	1
5. Other, _____	5	4	3	2	1

10. Please name the top three water-related problems you are facing today as well as their related causes:

Water Problems	Causes
1.	- - -
2.	- - -
3.	- - -

11. Do you think that Surface waters are polluted (Lake Qaraoun, Litani River and tributaries)? 1. Yes 2. No (*Go to question 14*)
3. Don't Know

12. In your opinion, on a scale of 1 to 5 where 5= very polluted and 1= not polluted at all, what is the degree of pollution of the Surface waters?
5. Very polluted 4. 3. 2. 1. Not polluted at all

13. If you think that Surface waters are polluted, please specify the degree of contribution of the various causes listed below to this pollution:

Causes of Pollution	Very High Contribution				No contribution at all
1. Sewage	5	4	3	2	1
2. Industrial wastes	5	4	3	2	1
3. Solid wastes	5	4	3	2	1
4. Agricultural wastes	5	4	3	2	1
5. Other, _____	5	4	3	2	1

14. Do you think that Ground water is polluted (springs and wells)?
1. Yes 2. No (*Go to question 17*) 3. Don't Know

15. In your opinion, on a scale of 1 to 5 where 5= very polluted and 1= not polluted at all, what is the degree of pollution of Ground water?
5. Very polluted 4. 3. 2. 1. Not polluted at all

16. If you think that Ground water is polluted, please specify the degree of contribution of the various causes listed below to this pollution:

Causes of Pollution	Very High Contribution				No contribution at all
1. Sewage	5	4	3	2	1
2. Industrial wastes	5	4	3	2	1
3. Solid wastes	5	4	3	2	1
4. Agricultural wastes	5	4	3	2	1
5. Other, _____	5	4	3	2	1

17. How do you dispose of your garbage?

1. in a nearby garbage dump 2. in special tanks where the municipality collects them

3. in special tanks where a private company collects them 4. Other _____

18. On a scale of 1 to 5, where 5= strongly agree and 1= strongly disagree, please specify the degree you agree/disagree with the following statements:

My actions can make a difference in:	Strongly agree				Strongly disagree
1. Reducing water pollution	5	4	3	2	1
2. Reducing the quantity of water wastages	5	4	3	2	1

19. **For each Water Management Function in the following list, please tell who is currently performing it and who you think should be handling it (*please check the main source-one answer*):**

Water Management function		Ministry of Energy and Water	Other Central Ministries (Env., Agric., Industries, Interior, etc)	Regional Water Establishment	Municipality	A local agency as Litani River Authority	Private sector	Private Wells	Nobody	Don't Know
1.Supplies drinking water	Who does it now?	1	2	3	4	5	6	7	97	99
	Who should do it?	1	2	3	4	5	6	7	97	99
2. Treats wastewater	Who does it now?	1	2	3	4	5	6		97	99
	Who should do it?	1	2	3	4	5	6		97	99
3. Measures water resources (surface and groundwater)	Who does it now?	1	2	3	4	5	6		97	99
	Who should do it?	1	2	3	4	5	6		97	99
4. Awards and monitors withdrawal authorizations (from springs, wells)	Who does it now?	1	2	3	4	5	6		97	99
	Who should do it?	1	2	3	4	5	6		97	99
5. Awards and monitors waste water releases	Who does it now?	1	2	3	4	5	6		97	99
	Who should do it?	1	2	3	4	5	6		97	99
6. Supplies irrigation water	Who does it now?	1	2	3	4	5	6	7	97	99
	Who should do it?	1	2	3	4	5	6	7	97	99
7. Informs the public about water relevant issues	Who does it now?	1	2	3	4	5	6		97	99
	Who should do it?	1	2	3	4	5	6		97	99

20. In your opinion, who do you think should pay for each of the following items: (*one answer per item*)

	Central government (using citizen taxes)	Residents based on flat fee	Residents based on their actual use	Nobody	Don't Know
1. Potable water supply	1	2	3	4	5
2. Treating residential sewage	1	2	3	4	5
	Central government (using citizen taxes)	Industries based on flat fee	Industries based on their actual use	Nobody	Don't Know
3. Industrial water supply	1	2	3	4	5
4. Treating industrial sewage	1	2	3	4	5
	Central government (using citizen taxes)	Farmers based on flat fee	Farmers based on their actual use	Nobody	Don't Know
5. Irrigation water	1	2	3	4	5
6. Dealing with agricultural pollution	1	2	3	4	5

21. Gender: 1. Male 2. Female

22. Age of respondent: _____

23. Educational level:

1. Illiterate 2. Primary school 3. Middle/intermediate school
4. Secondary school 5. Bachelor of Arts/Sciences 6. Masters or higher
7. Vocational training 97. No answer

24. In which profession/occupation do you work? (*If you currently hold multiple jobs, kindly choose the main one*)

1. Agriculture 2. Services 3. Industry 4. Public sector
6. University student 6.Housewife 7. Unemployed

Respondents Comments and Notes:

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