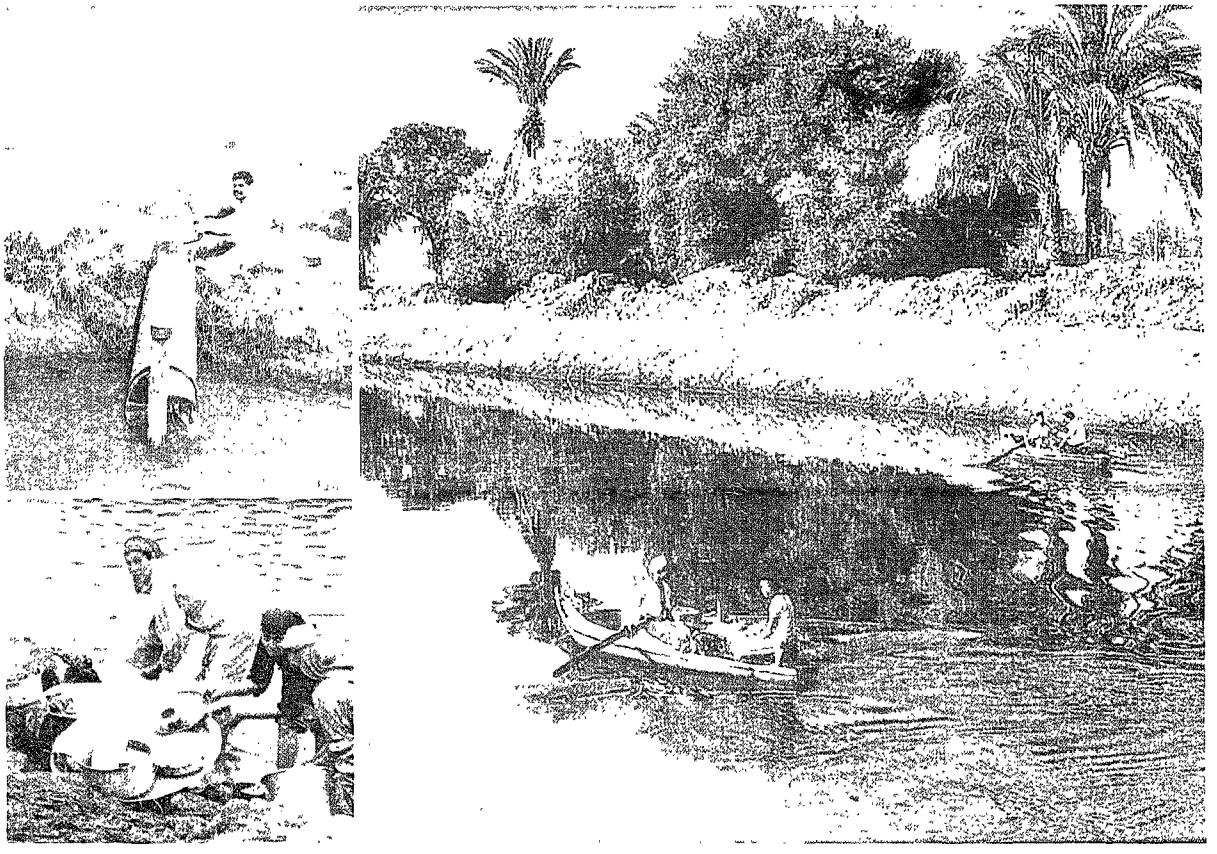
Knowledge, Attitudes and Practices of Egyptian Farmers Towards Water Resources

A National Survey
October 1998



Prepared by:
El-Zanaty & Associates

For:
GreenCom Egypt III of the Water Policy Reform Program
Agricultural Policy Reform Project
United States Agency for International Development

In Collaboration with:
Water Communication Unit, Ministry of Public Works & Water Resources

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GreenCOM

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Acknowledgements

Information on the knowledge, attitude and practices of Egyptian Farmers toward water management is of great importance to decision-makers as they work to meet the challenge of increasing demand for this vital resource. This data is also critical to GreenCOM and the Water Communication Unit staff as they design and implement appropriate communication interventions to increase awareness and encourage changes in water conservation and pollution prevention practices. This groundbreaking survey is the result of over nine months of work and would not have been possible without the support and contribution of many.

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Fatma El-Zanaty, PHD
Principal Investigator
President, El-Zanaty &Associates

Terminology

Agencies

AED	Academy for Educational Development
APRP	Agricultural Policy Reform Project
EPIQ	Environmental Policy
GreenCOM	Environmental Education and Communication Project
IFPRI	International Food Policy Research Institute
MFS	Monitoring, Forecasting and Simulation Unit
MPWWR	Ministry of Public Works and Water Resources
MSM	Main System Management Unit
MVE	Monitoring, Verification and Evaluation Unit
PMU	Project Management Unit/APRP
RDI	Reform, Design and Implementation Unit
USAID	US Agency for International Development
WCU	Water Communication Unit
WPAU	Water Policy Advisory Unit
WPRP	Water Policy Reform Program
WUA	Water User Association

Irrigation Terms

Bahar	A technical worker in the irrigation district
Sakia	An irrigation tool that is running using cows or other livestocks
Handasa	Irrigation district. One engineer per irrigation district. Comparable in size to administrative district.
Hiaza	Land holding
Mesqa	The lowest level of canal to which the MPWWR provides water.
Tanbour	A manual pump for raising water from the mesqa to the field.

Irrigation System of Canals:	Principle Canals begin at Nile Barrages Main canals begin at principle canals Branch canals begin at main canals Distributor canals begin at branch canals Mesqa may begin at either branch or distributor canals

Baseline Indicators[1]

Knowledge		Baseline value	Target value
1.	Know that the Nile is the main source of water	78%	85%
2.	Know that ten countries share the Nile	2%	50%
3.	Know that Egypt has a fixed water supply	61%	80%
4.	Know that Egypt cannot negotiate an increased quota	10%	25%
5.	Know that Egypt might face a water scarcity	33%	65%
6.	Know about the Tushka agricultural project	54%	75%
7.	Know about the Salam Canal agricultural project	15%	75%
8.	Ever heard of a Water Users Association	3%	50%
9.	Know that night irrigation takes less water/entails reduced evaporation	57%	70%
10.	Able to cite one key way a farmer can save water	20%	50%
11.	Know that rice is a crop that consumes a lot of water	67%	85%
12.	Proportion of rice farmers who have ever heard of a short duration variety of rice	63%	80%
13.	Proportion of rice farmers who can name one variety of short season rice (Giza 4000, Giza 177 or Giza 178)	45%	65%
14.	Know that the Ministry limits rice growing because of its high water requirement	57%	80%
15.	Proportion of sugar cane farmers who say they couldn't grow sugar beet because they don't know anything about it (60/119)	50%	35%

Attitudes		Baseline value	Target value
16.	Consider water requirements in crop selection	34%	50%
17.	Would join a Water Users Association if one were formed in their area	78%	85%

[1] Percentages are expressed as a proportion of all male farmers unless otherwise specified.

Communication	Baseline value	Target value
18. Ever seen anything on television about conservation of irrigation water	6%	25%
19. Ever seen anything on television about pollution of irrigation water	6%	25%
20. Ever heard anything on the radio about conservation of irrigation water	15%	40%
21. Ever heard anything on the radio about pollution of irrigation water	15%	40%
22. Ever read anything about conservation of irrigation water	14%	25%
23. Ever read anything about pollution of irrigation water	14%	25%
24. Asked an irrigation engineer for advice in crop selection	0%	5%
25. Know the name of their irrigation engineer	13%	30%
26. Talked with irrigation engineer last year	9%	15%
27. Have information needed to choose new crops to try?	36%	

Practice	Baseline value	Target value
28. Proportion of rice farmers who grew a short season rice last summer	30%	

Executive Summary

Background

When Greek historian Herodotus described Egypt as "the gift of the Nile" in around 450 BC, Egypt must have been quite a different country. Almost two and a half thousand years later, Egypt is still the gift of the Nile, but the gift is being shared by a population whose size Herodotus could never have imagined. In 1996, the amount of water available per capita dropped below the international standard of 1000 m^3 per person, and it is projected to continue declining. While family planning programs are working to lower the population growth rate, the Ministry of Public Works and Water Resources (MPWWR)[1] is working to increase the efficiency of water use, particularly in agriculture, where 86 percent of the water is consumed.

Within the framework of the Agricultural Policy Reform Project (APRP), the Ministry and the US Agency For International Development (USAID) are cooperatively engaged in the implementation of a Water Policy Reform Program (WPRP). The goal is to improve allocation of water resources in such a way that growing water demands can be met and global water use efficiency can be increased. As part of the WPRP, the GreenCOM Project works with the Ministry's Water Communication Unit (WCU) to implement a participatory communication program. The goal of the GreenCOM Project is to increase public awareness of the need for water conservation and protection of the Nile system from pollution. More specifically, GreenCOM/WCU are working to improve Ministry staff capability to organize and communicate with water users and to increase farmer participation in Water User Associations, cost sharing, pollution prevention and water resource management.

The objectives of this National Survey of Egyptian farmers were to:

- Provide information to help GreenCOM and the WCU design appropriate communication interventions.
- Identify baseline measures for male and female farmers' knowledge, attitudes and practices concerning water resource management. These measures will be used to determine the impact of communication interventions.
- Provide information that may be useful to decision makers in policy formulation.

Methodology

The results in this report are based on a national sample of respondents, using a sample frame designed specifically for the purpose of learning about the knowledge, attitudes and practices of farmers at the *mesqa* level. To do this, a multistage probability sample was designed that mirrors the irrigation system of the country. The five stages entailed probability sampling at the levels of irrigation directorate, irrigation inspectorate, *handasa*,

[1] Referred to as "the Ministry" for ease of readability.

mesqa and farmers. El-Zanaty and Associates sent listing staff to 245 *mesqas* throughout the country, where they recorded the names of all 9,410 farmers drawing water from those *mesqas*. This list of 9,410 farmers is a sample frame, from which was drawn a systematic random sample of 2,183 farmers selected for interview in this study. The same sample frame will be used to draw respondents for the impact survey at the end of the project and could be used for an in-depth study if needed.

The study broached a topic new to the Ministry: differences in knowledge, attitudes and practices between men and women. A set of 197 female farmers were identified during the listing and interviewed with the same questionnaire as male farmers, and the wives of 20 percent of male farmers were randomly selected for interview and administered a shortened version of the questionnaire.

The average male farmer interviewed was 48 years old and married, with 10 household members. Half had never attended school. Almost all their homes had electricity and a television set, while half had piped water in their homes. Half of these farmers owned cows and diesel pumps; the average area cultivated was 3 feddans and the average area owned was 2 feddans.

The average female farmer interviewed was 50 years old, and 7 in 10 were widowed; their households were smaller, with 6 members on average. Almost all female farmers had never attended school. Almost all their homes had electricity, two-thirds had a television set while around 4 in 10 had piped water at home. Just under a third of female farmers owned cows and a diesel pump; the average area cultivated was 1.3 feddans and the average area owned was 1.2 feddans.

Knowledge

As knowledge and awareness of an issue are both prerequisite to increasing participation in decision making and to behavior change, GreenCOM communication interventions will focus on the first steps in behavior change, increasing knowledge and changing attitudes. In selected pilot areas, the project expects to help influence behavior as well.

Respondents' knowledge of **national water issues** was varied. There are strong discrepancies between men and women, and relatively low knowledge of some of the national issues. The level of "don't know" responses was high in many cases.

While most men know that the Nile is the main source of water, almost none can cite the correct number of countries drawing water from the Nile: in fact, 61 percent of male farmers, 91 percent of female farmers and 88 percent of wives simply said they didn't know how many countries share the Nile. Twenty-nine percent of male farmers, 58 percent of female farmers and 68 percent of wives said they didn't know whether Egypt might face a water scarcity in the future. As expected, many respondents -33 percent of male farmers, 64 percent of female farmers and 74 percent of wives- were unaware that Egypt cannot increase its quota of water without negotiation with countries in the region.

Despite considerable publicity about the two largest GOE irrigation, water projects, knowledge of the Toushka and Salam Canal projects was by no means universal. When asked to name the largest agricultural development projects in the country, just over half of

male farmers named the Toushka project, while only 14 percent of female farmers and 23 percent of wives named it, and the majority of all respondents did not name the Salam Canal project.

A fairly high proportion of men (61 percent) say they knew that the water supply is fixed, and although the population is growing rapidly, only 33 percent say that Egypt might face a water scarcity.

Respondents answered a number of questions regarding **Water User Associations** (WUAs). These associations will underpin the Ministry's efforts to increase farmer participation in water management. At the time of the field survey, 2,802 WUAs were in some stage of registration, covering 1.7 percent of the agricultural land, and the Ministry had not yet begun to publicize their formation to a national audience. The vast majority of these WUAs had been established only in areas of the country served by the Irrigation Improvement Project. Consequently, it is not surprising that only 3 percent of male farmers, 0.5 percent of female farmers and 2 percent of wives had ever heard of a Water User Association. None of the respondents belonged to a WUA.

The Ministry is concerned to know how much knowledge farmers already have about **methods of reducing the water they use in irrigation.** When asked if they had any idea how to use less water for irrigation, only 20 percent of male farmers, 4 percent of female farmers and 3 percent of wives cited at least one way to do so. The methods cited were mainly irrigation section by section, cultivating on the furrow and sprinkler irrigation. When asked about the advantages of night irrigation, 57 percent of male farmers responded that it requires less water or reduces evaporation losses. All farmers were asked about their methods of land leveling and if they did level, whether there was a better method than their current method. Among farmers who only level by hand (n=112), 55 percent said no, among those who only level by mechanical cultivator (n=1,418), 82 percent said no, and among those who only level by laser (n=50), all said no.

Recently a Rice Working Group, composed of representatives from MPWWR, the Ministry of Agriculture and Land Reclamation and the APRP, was formed to study options associated with water conservation and **rice cultivation** in Egypt. The matter is high on the Ministry's agenda, because of the increasing amount of rice grown, and the subject has a fairly high profile among Egyptian farmers. The Ministry has established legal limitations on the amount of land on which rice can be grown, as well as fines for farmers who grow rice outside those areas. It is important that farmers know the reason why the Ministry has set this limit. When asked if they knew why the Ministry limited the area for rice cultivation, 57 percent of male farmers and 30 percent of female farmers said it was rice's high water consumption. When asked which crop uses the most water, a somewhat higher proportion of farmers – 67 percent of male farmers and 70 percent of female farmers-cited rice.

One important recommendation by the Rice Working Group is the promotion of short duration varieties – those varieties that produce a higher yield while maturing more quickly, thereby using significantly less water. When rice farmers[2] were asked whether they knew of such a variety, 63 percent of male and 59 percent of female farmers said yes. When

[2] Those who were currently growing or had ever grown rice.

asked for the name of the variety, 45 percent of male and 46 percent of female rice farmers named one of two varieties that the Ministry is promoting (Giza 177 and 178).

Attitudes

Given that a major aim of the Ministry is to increase farmer participation in water management, it is important to understand water management from the farmer's perspective. Towards this end, the research addressed a number of questions related to **farmers' problems and attitudes towards the Ministry**. Farmers were asked what they would like to discuss with a senior Ministry official if they had the opportunity. There is only one main request -- they want more water. This topic was cited by 8 in 10 male farmers and a similar proportion of female farmers. It is remarkable that the second most cited subject, cleaning the canal, was given by only 9 percent of male and 4 percent of female farmers. A similar pattern applies to farmers' feelings about the future of irrigation: around 7 in 10 farmers again cited water availability as their most critical worry.

These two findings suggest that the Ministry may have quite a challenge shifting farmers' minds away from using more water to using less water. However, if the Ministry were to advance the new strategies (Water User Associations, crop selection, etc.) as ways to provide the water farmers need, farmers may find that these strategies address their most pressing needs.

Farmers had a varied appreciation of the complexity of the Ministry's work. Around half of all farmers felt that the task of delivering water is hard or very hard, while 34 percent of men and 43 percent of women weren't at all sympathetic, saying they felt the Ministry had an easy task bringing water to farmers. It may be possible to improve understanding between farmers and the Ministry through television spots showing the work that the Ministry does to bring water from Aswan to each farm holding in the country.

Farmers are almost unified in their opinion that the Ministry could do a better job of delivering water. A communication program framed by the idea that the Ministry is working to make improvements in the way it delivers water may resonate well with farmers.

An important policy question being addressed by the Ministry is the opportunity for **cost recovery**. Farmers refused vigorously to respond to questions in the pretest questionnaire which asked how much they would be willing to contribute to different irrigation improvements. Those questions were replaced by broader questions about general willingness to pay.

The data suggest that most farmers are generally ready to contribute to improvements. When asked if they would be willing to share in the costs of improving the waterways in order to provide continuous flow, 76 percent of male and 50 percent of female farmers said they were willing. Similar proportions were willing to share in the costs of upgrading the drainage system: 73 percent of male and 47 percent of female farmers. In both questions, there are two interesting points regarding the role of education in male farmers' responses. First, better-educated farmers were significantly more willing to share in these costs than less-educated farmers. Among male farmers with secondary education's, 88 percent were willing to contribute to continuous flow improvements, and 75 percent were willing to share in drainage improvements. Second, the proportion of uneducated farmers willing to share in

these costs was still high: 73 percent for continuous flow improvements and 68 percent for drainage improvements.

The fact that farmers rejected outright questions about willingness to pay and were willing to respond to broader questions suggests that the Ministry may seek to avoid casting efforts to increase farmer participation in water management as a method of cost recovery.

The Ministry is strongly committed to establishing Water User Associations nationwide, so it is interesting to look at some measures of **readiness to participate in Water User Associations.**

During the interview, the interviewer explained to each respondent that:

> *Water User Associations exist in some parts of the country and function as follows. Farmers on one mesqa select a representative to the association, which meets regularly with the district irrigation engineer to determine the major repairs that need to be made. The association is also responsible for organizing regular mesqa maintenance and resolving conflicts.*

Based on that understanding of WUAs, the results suggest a high level of readiness among farmers to accept and join WUAs. Almost 9 in 10 male farmers believe they could benefit by participating in a WUA, and almost 8 in 10 said they actually would join such an association if it were formed nearby. Wives responded about their husbands' readiness to join in similar proportions. Female farmers, perhaps as expected, were more reluctant: 1 in 5 were unable to imagine joining predominantly male groups. Just over a third of female farmers said they would join an association if it were formed nearby.

The questionnaire also asked a set of four questions intended to examine conflict resolution procedures currently in place at the *mesqa* level. It is interesting to see which conflicts farmers resolve among themselves, and which ones are resolved with the intervention of groups – mainly the agricultural society. Respondents were asked if there was a penalty against a farmer for four hypothetical conflicts:

1. A farmer not sharing in the costs of cleaning the *mesqa*.
2. A farmer's tractor breaking a *mesqa* bridge.
3. A farmer sabotaging a neighbor's crop.
4. A farmer taking more than his share of water.

If the respondent named a penalty, he was asked who would administer that penalty. Respondents were permitted to list more than one person or organization responsible for administering the penalty.

For the first three infractions, more than half of the farmers said that a penalty would apply. If a farmer didn't contribute towards cleaning the *mesqa*, almost two-thirds of farmers said a monetary penalty would be imposed, mainly administered by the agricultural society. If a farmer's tractor breaks a *mesqa* bridge, 54 percent said a penalty would apply, usually work, and usually administered by *mesqa* users. If a farmer sabotages another farmer's crop,

farmers were united in saying that there would be a penalty, most often money, and usually administered by the police.

However, it is interesting that if a farmer takes more than his share of water, almost all farmers (90 percent) said that no penalty would apply. In the case that a penalty is applied, it is usually money, and usually administered by *mesqa* users. If, as the survey indicates, farmers really lack a method of ensuring that every farmer takes his fair share of water, the Water User Associations might be positioned as a way to do so.

The final important area of attitude measurement was respondents' attitudes towards **policy changes.** The government has made several major changes in its management of the agricultural sector in recent years. The government no longer determines which crops must be planted or purchase prices for crops and has reduced the subsidy on inputs. When asked whether these changes had caused them to change their cropping pattern, a surprisingly low 11 percent of male and 5 percent of female farmers said yes. Almost two-thirds of male farmers and 56 percent of female farmers said that they welcome these changes, while substantial minorities of farmers do not welcome them – 25 percent of male farmers and 17 percent of female farmers. In most cases, these changes have not resulted in increased profit margins for farmers: around two-thirds of male and female farmers' profit margins have remained the same.

Practices

Irrigation practices

The survey provided detailed information about irrigation practices. Around 8 in 10 farmers use diesel pumps to take water out of the *mesqa*, and virtually every farmer uses flood irrigation, while 72 percent use flood and furrow. Farmers carry out half of their summer irrigations at night (8 of 16, on average), and about a quarter of winter irrigations (2 of 7, on average). Farmers in the region that requires the greatest number of irrigations in the summer, East Delta, do the highest proportion of irrigations at night (18 of 33).

All farmers level their land, and 88 percent level by mechanical means. There is a significant regional difference: in the Delta, fewer than 7 percent level their land by hand, compared to 23 percent in Middle Egypt and 44 percent in Upper Egypt.

Farmers at the end of the canal or the *mesqa* use ground water and, where available, drainage waters more than those at the beginning of the canal or *mesqa.*

The main summer crops are maize, rice and cotton, and in the winter, clover and wheat. Different crops require different irrigation practices. Rice, sugar cane, wheat and clover are irrigated mainly by flood, while cotton and maize are irrigated mainly by furrow.

In the summer of 1997, 30 percent of farmers grew rice (excluding Upper Egypt, where no rice is grown), with the highest concentration in the East Delta, where 8 in 10 farmers grew rice. Rice is grown partly for household consumption in every case, but among 40 percent of farmers, rice is grown exclusively for household consumption. This proportion varies only slightly among the regions, from 27 percent in the Middle Delta to 44 percent in the East Delta. In the summer of 1997, 31 percent of farmers who grew rice grew a short

duration variety. On average, rice is irrigated 32 times. The mean cost of rice irrigation is LE 233 per feddan: LE 348 in Middle Egypt, LE 250 in the East Delta and LE 236 in the West Delta.

A third of farmers in Upper Egypt cultivate sugar cane during the year (it is almost exclusively an Upper Egyptian crop). Almost all respondents who cultivated it grew it year round. It is primarily a market crop (for 91 percent of farmers) and requires an average of nine irrigations costing LE 158 per feddan.

Twenty percent of farmers in Egypt grow cotton in the summer. It is exclusively a market crop, requiring an average of seven irrigations, costing an average of LE 125 per feddan. The cost varies from LE 161 in Middle Egypt to LE 110 in the Middle and West Delta.

Irrigation problems farmers face

Almost 2 in 3 farmers (64 percent) say they lack adequate water for irrigation in the summer, with the highest proportion in East Delta (74 percent) and Middle Delta (77 percent). The problem is smallest in Upper Egypt, where only 40 percent report an inadequate supply for the crops they grow. In winter, 20 percent of farmers in Egypt say they have inadequate water, ranging from 11 percent in the East Delta to 31 percent in the Middle Delta.

In the summer, water does not always reach the ends of the *mesqa*: overall, 76 percent of farmers said that it only sometimes reaches the end of the *mesqa* – ranging from 55 percent in Upper Egypt to 88 percent in the Middle Delta. The issue is half as problematic in the winter, when 33 percent of farmers say that it only sometimes reaches the end, from 24 percent in the East Delta and Upper Egypt to 49 percent in the Middle Delta.

The data suggest that the key factor in problems of water availability lies at the canal level rather than the *mesqa* level. There are significant differences in water availability between farmers whose *mesqa* lies at the beginning and end of a canal, but not between farmers whose farms lie at the beginning and end of a *mesqa*.

Just over half of farmers (54 percent) say that they lost crops in the last year due to lack of water. The proportion ranges from 73 percent of farmers in the East Delta to 33 percent of farmers in Upper Egypt. There are significant differences in the proportion who lost crops between farmers whose *mesqa* lies at the beginning and end of a canal, but not between farmers whose farms lie at the beginning and end of a *mesqa*.

While almost two-thirds of farmers (64 percent) said that water always flows in the canal on schedule, only 40 percent said that it always flows in the *mesqa* on schedule. In the East Delta, fully 76 percent said that the water always flows on schedule in the canal, compared to a low 43 percent in Middle Egypt. Again, while there is a difference between farmers whose *mesqa* is at the beginning (71 percent) and end (57 percent) of the canal, there is no difference between farmers whose farms lie at the beginning (65 percent) and end (64 percent) of a *mesqa*.

Farmers mainly felt that the reason water does not always flow on schedule is lack of water, with 17 percent saying it is because the waterways are not cleared.

Farmers are almost evenly split over the quality of the water they use – 54 percent say it is clean, 46 percent say it is polluted. Regionally, more Delta farmers (around half) feel that their water is polluted than Upper Egyptian farmers (less than a third).

The leading source of contamination, cited by 72 percent of respondents who said the water was polluted, was household wastewater, followed by sewage (42 percent) and dead animals (23 percent). Regionally, the East Delta is slightly different than the other regions, where 45 percent of farmers cited household wastewater and 76 percent cited sewage, suggesting that the sewage systems are especially inadequate in that region. They also cited a higher percentage of industrial waste than farmers in other regions.

When asked who is responsible for cleaning the *mesqa*, 56 percent of farmers identified themselves and 48 percent identified the agricultural cooperatives, suggesting that they are well aware this is not the Ministry's responsibility. One in 8 believed it is the responsibility of the irrigation engineer.

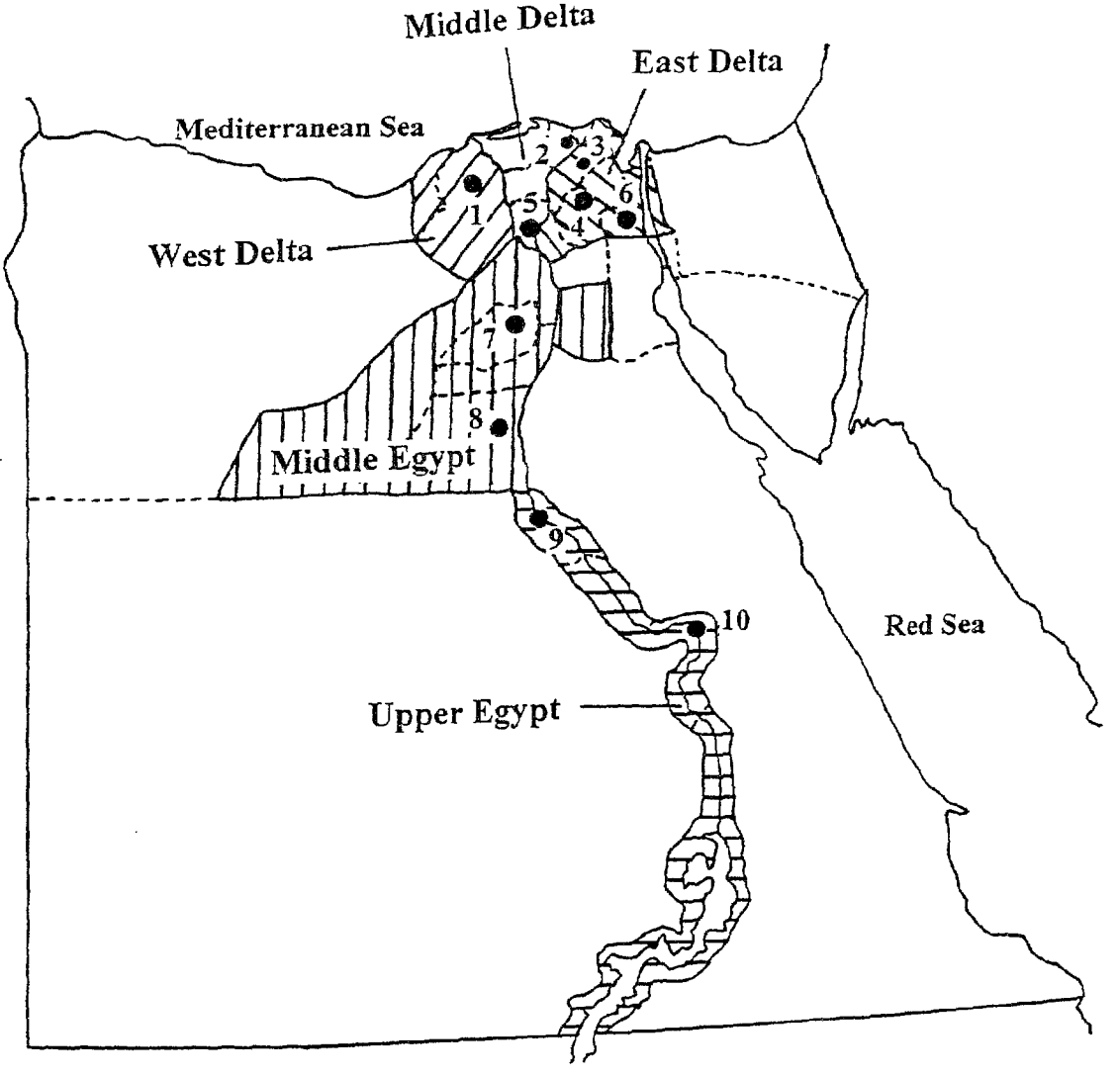
Wives' role in agriculture and irrigation

Many but not the majority of farmers' wives help in agriculture and irrigation (43 percent). While most wives help with cultivation, about a third of wives also help with irrigation. There is a significant regional variation: only 9 percent of wives in Upper Egypt help their husbands in agriculture and irrigation, compared to 47 percent in the other four regions. Wives are surprisingly knowledgeable about irrigation problems, reporting a pattern of problems similar to those reported by their husbands. This suggests that farmers and their wives communicate well with each other about on-farm water problems.

Communication

Farmers have access to television and radio, but little access to print media due to low levels of literacy. Among interpersonal sources, the survey suggests that farmers mainly seek information on agriculture and irrigation from their agricultural cooperative, other farmers, the agricultural engineer and, in the case of irrigation problems, from the irrigation engineer.

Egypt



1- Behera

2- Dakahlia (Middle Delta)

3- Dakahlia (East Delta)

4- Kalyubia

5- Menoufia

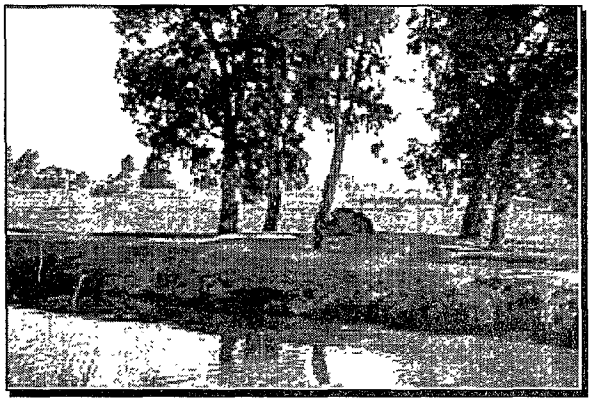
6- Ismailia

7- Fayoum

8- Menya

9- Assuit

10- Qena



Chapter 1

Background

The Nile River is the main source of water in Egypt. According to the 1959 Sudan Treaty, Egypt has a quota of 55.5 billion cubic meters of Nile water per year — an annual average of 1,893 cubic meters per person at the time the treaty was written. Based on population projections, that quota will decrease to 637 cubic meters per person by 2025. As of 1996, $936m^3$ amount of water was available per capita - already below the international standard of $1000m^3$ per person. Eighty-six percent of Egypt's quota of water goes to agriculture, and demand is increasing, due to agricultural expansion and other factors. In addition, there are water development projects planned in the other nine countries of the Nile Basin. Due to all these factors, there is pressure to make water use in Egypt more efficient. If this cannot be done, Egypt may well face a problem of water scarcity.

The GreenCom Project is a global environmental education and communication initiative of the Academy for Educational Development. In Egypt, GreenCOM provides technical assistance to the Water Communication Unit (WCU) of the Ministry of Public Works and Water Resources (MPWWR) as it implements a participatory communication program. The overall goal of the project is to increase public awareness that Egypt's water resources are limited and to encourage behavior modifications to conserve water and prevent pollution. Since farmers use 86 percent of the water consumed in Egypt, they are a primary target audience. Additional audiences for the communication program include MPWWR field engineers, decision makers and the general public.

Currently, there are a number of strategies for improved on-farm water management that the Ministry wishes to encourage farmers to adopt. They include:

- Modern irrigation and cultivation methods,
- Increased night irrigation,
- Improved land leveling,
- Changes in the cropping pattern, and
- A reduction in water pollution so that available water resources are not depleted.

To achieve appropriate changes in behavior, particularly among farmers, the project staff aims to increase farmer participation in water policy formulation and implementation. In democratic societies, improved policies are realized through customer participation in decision making. Water users can participate in the policy-making process if they are well informed and if they have access to open channels of communication. Two-way

communication will help both policy makers and water users understand each other's concerns and pave the way to change.

The knowledge, attitudes and practices (KAP) of farmers toward water consumption were investigated in a baseline survey conducted by El-Zanaty and Associates in collaboration with GreenCOM/WCU. This survey was undertaken to better understand and quantify farmers' knowledge, attitudes and practices regarding water resource management.

1.1 Survey Objectives

GreenCOM/WCU contracted El-Zanaty and Associates to undertake a large, national study of farmers to learn in detail about their knowledge, attitudes and practices (KAP) concerning water consumption. In addition, the worldwide GreenCom Project incorporates gender considerations in all aspects of program design and implementation, and this provided the research with an additional objective.

The objectives of the Farmer KAP Survey were to:

- Provide information to help GreenCOM/WCU design appropriate communication interventions.
- Identify baseline measures for male and female farmers' knowledge, attitudes and practices concerning water resource management. These measures will be used to determine the impact of communication interventions.
- Provide information that may be useful to decision makers in policy formulation.

The WCU posed the following research questions at the beginning of the study, based on consultations within the Ministry and on previous, smaller scale studies:

1. How much do farmers know about the national water situation and about efficient irrigation practices?
2. Are farmers disposed to use less water in agriculture?
3. How efficiently are farmers irrigating different crops?
4. What practices might farmers be willing and able to adopt to make their water use more efficient?
5. Where are the major problems in the system – at the *mesqa* level or the canal level?
6. What differences are there in knowledge, attitudes and practices between men and women farmers?
7. What role do farmers wives' play in irrigation?
8. Given that the Ministry's main personal contact with farmers come through district irrigation engineers, how good are farmers' current relations with these engineers?
9. How could communication interventions be best directed at farmers?

1.2 Organization of the Report

The findings of the survey are presented here in 10 chapters as follows:

- The introductory chapters (Chapters 1-3) discuss the survey objectives, methodology and background characteristics of the farmers.

- Chapter 4 discusses farmers' knowledge about national water resource issues, Water User Associations (WUAs), methods of saving water in irrigation and Ministry policies.

- Chapter 4 discusses farmers' knowledge about national water resource issues, Water User Associations (WUAs), methods of saving water in irrigation and Ministry policies.

- Chapter 5 review attitudes toward the Ministry cost recovery, WUAs and policy changes.

- The chapters concerning practice (Chapters 6-9) look at general irrigation practices, cropping patterns, irrigation patterns by crop, irrigation problems and communication about irrigation. Wives' roles in irrigation are also analyzed in this section.

- The conclusion (Chapter 10) reviews overall themes that have emerged in the analysis. Key findings are summarized at the beginning of the report, and key program indicators are provided with baseline and target values.

The following notes may help the reader. Throughout the report:

- Recommendations for the communication intervention are highlighted in bullet form.
- "Significant" differences refer to differences that are statistically significant at the $p<0.01$ level, unless otherwise specified.
- The MPWWR is referred to as "the Ministry."
- Where multiple response are possible, percentages do not sum to 100 percent.

Chapter 2

Methodology

To best address the information needs of the MPWWR the sample was designed to mirror the irrigation system of the country. The sample size is large, and the sample frame is designed to be used again for an impact survey, so that the Ministry will be able to quantify the impact of interventions. The sample frame may also be used for additional in-depth studies of particular issues with farmers from a selected region or other variable.

An extensive questionnaire measured farmers' knowledge, attitudes and practices on a total of around 200 questions. Careful quality control measures included re-listing on ten percent of selected *mesqas*, callbacks to make the greatest possible effort to complete interviews with selected respondents, re-interviewing 10 percent of respondents and re-entry of half of the questionnaires on the computer.

2.1 Organization and Implementation of the Survey

The survey was conducted in four stages between January 1998 and August 1998. The first phase involved preparatory activities, including sample design, and selection activities such as farmers' listing. At the same time, the survey questionnaires were developed, pretested and finalized. This stage took around four months. The second phase involved interviewing farmers and wives, which took around three weeks. The third phase involved all of the data processing necessary to produce a clean data file, including editing, coding, entering, and verifying data and checking for consistency. The final phase of the survey involved data analysis and report preparation. Following is a detailed description of each of these activities.

Sampling Size and Sampling Unit

Since the Ministry's goal is to reach farmers, it was determined to interview only farmers, and due to the Ministry's interest in farmers at the *mesqa* level, a household survey was ruled out. Since our ultimate aim is to change irrigation behaviors, we defined as our eligible respondents individuals responsible for decision making regarding agricultural land use, crop selection and water management.

The overall target sample was 2,000 male farmers, in addition to all female farmers. This was expected to give a sample of around 2,200 farmers to be interviewed in the field proportionally distributed over the main five regions. Due to GreenCOM's special interest

in women, we determined to interview as many women farmers as possible, as well as twenty percent of male farmers' wives randomly selected to be interviewed in their houses.

Sample Design and Selection

Extensive experience in conducting national surveys has taught us that high-quality sample design and implementation, particularly sample frame design, are costly and time consuming. However, the need to produce a high-quality sample frame for a nationally representative sample of farmers that we could use again for an impact survey made the effort worthwhile.

The sample was designed to reflect the divisions through which the Ministry works: five irrigation regions,[1] and within these, directorates, inspectorates, and *handasas*, which are roughly equivalent to administrative districts. To achieve these objectives, a multistage probability sample of farmers was designed.

First Stage: the systematic selection of half of the directorates in each region, a total of 11 directorates. The probability of selecting each directorate was:

$$= \frac{\text{total number of farmers in the directorate}}{\text{Total number of farmers in the region}}$$

Second Stage: the random selection of only one inspectorate from each selected directorate, or eleven inspectorates total. The probability of selecting each inspectorate was:

$$= \frac{\text{total number of farmers in the inspectorate}}{\text{Total number of farmers in the directorate}}$$

Third Stage: In this stage two *handasas* were chosen randomly from each selected inspectorate, or 22 *handasas* according to the following probability:

$$= \frac{\text{total number of farmers in the district}}{\text{Total number of farmers in the inspectorate}}$$

The number of *hiaza* (land holdings) was used as a proxy to the number of farmers in the first, second and third stages, because the number of farmers was not available at the directorate, inspectorate or *handasa* levels. Information about the number of *hiaza* was taken from the results of the Agricultural Census, 1990.

Fourth Stage: Three canals were selected randomly with probability proportional to the area of lands cultivated by the canal from each handasa, yielding a total of 66 canals. A list of the selected directorates, inspectorates, *handasas* and canals is presented in Appendix B.

[1] It was decided that new lands would not be included in the sample frame since improved irrigation methods are typically in use in these areas.

Four *mesqas* were selected from each canal. Since irrigation problems differ dramatically between the beginning and the end of any canal system, two *mesqas* were selected from the beginning of the canal and two from the end of the canal. If there are fewer than four *mesqas* on the canal, then all were selected. A total of 245 *mesqas* were selected from the five regions. Then farmer listing was conducted in the selected *mesqas*.

Farmer Listing

During the sample implementation of the survey, a farmer listing was conducted in the 245 selected *mesqas*. Fifteen listing satff attended a one-week training course, which included classroom lectures and two days of field practice in the Giza area. After the training, 11 listers were selected and each was assigned to work in one directorate. A detailed map for each of the 66 ***handasa*** with the selected canals marked on it was provided to each team for the listing operation. The listing operation began in the last week of February 1998 and continued for about two weeks. For quality control purposes about 10 percent of the ***mesqas*** were selected for re-listing.

For the purpose of the survey, an eligible farmer was defined as the person responsible for decision making regarding agricultural land use, crop selection and water management. The farmer might or might not be the landowner and might be male or female. The listing resulted in a sample frame or list of 9,410 farmers throughout the country (9,044 male and 366 female).

Fifth stage: A random, systematic, self-weighted sample of farmers on each ***mesqa*** was drawn with probability proportional to size. The expected sample size was 2,000 male farmers and 200 female farmers. The final list of selected farmers was comprised of 1,986 and 197 female farmers.

Questionnaire Development and Pre-test

The KAP survey included two main questionnaires, a farmer questionnaire and a farmer's wife questionnaire. The interviews were conducted individually in the field with the male and female farmers and at home with wives. The objectives of the questions, developed collaboratively with the GreenCOM/WCU project staff, were to assess men's and women's knowledge, attitudes and behavior concerning water management. Questions sought information on the:

- Farmer's background
- Knowledge of and attitudes toward irrigation and water distribution
- Selection of crops
- Wife's role in irrigation and agriculture
- Liberalization of agriculture
- Farmer's understanding of Ministry policies
- Farmer's awareness of the water situation in Egypt
- Nature of the farmer's exposure to mass media

The farmer's wife questionnaire was a shorter version of the farmer questionnaire and asked for the wife's background, knowledge and attitudes toward irrigation and water distribution,

wife's role, understanding of Ministry policies, awareness of the water situation in Egypt and the nature of her exposure to mass media.

After drafting the questionnaires in English, we gave them to GreenCOM/WCU for comments incorporated their suggestions and had all materials translated into Arabic for the pretest. Following two days of training, six interviewers pretested the questionnaires in Menoufia and Dakahlia in April 1998. A total of 90 farmers' questionnaires and 20 wives' questionnaires were completed during the pretest. Based on the pretest results the questionnaires were reviewed and finalized. English versions of the final questionnaires are included in Appendix C.

Data Collection Activities

Materials were developed for use in training personnel involved in the fieldwork. An interviewer's manual presented general guidelines to follow while conducting an interview, with specific instructions for asking particular questions. Also, a brief supervisor's manual described the duties of the team coordinator and rules for field editing.

A set of field and office control forms for tracking the fieldwork was developed and tested in the training program.

A group of 34 male interviewers completed a special one-week training program in late April 1998. The training program included:

- general lectures related to specific survey topics (e.g., water problems in Egypt, irrigation systems),
- specific sessions with visual aids on how to fill out the questionnaires,
- opportunities for role playing and mock interviews,
- one-day field practice in areas not covered in the survey, and
- two exams.

At the end of the training course a total of 27 interviewers were selected to share in the main data collection.

Fieldwork

Fieldwork started on April 24, 1998, and was completed May 10, 1998. The field staff was divided into six teams; each team had one-coordinator and three to four interviewers. The coordinator was responsible for organizing the fieldwork for the team, reviewing and verifying the consistency of the questionnaires in the field and conducting some of the wives' interviews.

As soon as the main data collection was completed for a team, a random sample of up to 10 percent of the farmers was selected for re-interview as a quality control measure. A shorter version of the KAP Survey questionnaire was used for the re-interviews. In addition, during the re-interview stage, callbacks were conducted with individuals who were not available at the time of the original visit. During this stage, interviewers were not allowed to work in the same area in which they participated in the initial fieldwork. Callbacks and re-interviews began May 11 and were completed May 17, 1998.

Data Processing Activities

Completed questionnaires were sent from the field to the office for registration directly after the completion of a canal. Office editors reviewed the questionnaires for consistency and completeness, and some problems were resolved in the office prior to data entry. Other problems were returned to the field teams through a summary report written by office staff and sent to the field teams.

Data entry and editing phases began while interviewing teams were still in the field. The data from questionnaires were entered and edited on microcomputers using the Integrated System for Survey Analysis (ISSA), a software package developed especially for survey work. Five computers were used for data entry for two shifts. Verification and consistency checks were done to ensure the quality and accuracy of the data. About 50 percent of the questionnaires were re-entered for verification.

Data entry, verification and editing of data were completed by the end of May. A clean tape was prepared and converted to SPSS under Windows for the analysis.

2.2 Survey Coverage

A summary of the outcome of the fieldwork of the KAP Survey by region is presented in Table 2.1. The table shows that a total of 2,098 farmers (male and female) were successfully interviewed. For male farmers, a total of 1,910 questionnaires were completed with a response rate of 96 percent. For female farmers, 188 questionnaires were completed with a response rate of 95 percent. For the wives subsample, a total of 355 questionnaires were completed with a response rate of 90 percent. Response rates are high for both male and female farmers and differ little by region.

Table 2.1: Distribution of farmers' sample and response rates, by sex and region. KAP Survey, 1998.

Variable & Category	Region					Total
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	
Farmers						
Male Sample	288	461	445	399	393	1986
Male Interviewed	274	440	429	389	378	1910
Response Rate	95.1	95.4	96.4	97.5	96.2	96.2
Female Sample	22	53	63	43	16	197
Female Interviewed	20	50	63	39	16	188
Response Rate	95.5	94.3	100.0	90.7	100.0	95.4
Wives						
Wives Subsample	55	87	85	85	82	394
Wives Subsample Interviewed	52	77	79	75	72	355
Response Rate	94.5	88.5	92.9	88.2	87.8	90.1

Chapter 3

Farmers' Background Characteristics

The objective of this chapter is to provide a socioeconomic profile of the KAP Survey sample for both male and female farmers, to help in understanding the results presented in the following chapters. This is accomplished by examining the general characteristics of the farmers interviewed and the households in which they live. This profile includes information on age, education, marital status, number of household members and school attendance among children. The characteristics of households in which farmers live include household possessions and land holdings.

3.1 Education, Marital Status and Family Size

Table 3.1 presents the distribution of farmers by various background characteristics including age, education, marital status, mean number of household members, number of children under age 16 and school attendance among children. Looking at the age distribution in Table 3.1, 17 percent of the farmers are under age 35, around half are between age 35 and 54, and around 30 percent are age 55 and over. The mean age of male farmers is 47.9, with statistically significant but small differences between regions.

Female farmers are significantly older than male farmers. The mean age of males is 47.9 compared with 49.7 for females. This may be due to the fact that most female farmers are widowed. Most of the male farmers are married; only a small proportion are single. The table shows that more than 50 percent of male farmers have no education; however, a substantial proportion (18 percent) have secondary or higher education. Around one-quarter of the male sample has primary education. Female farmers have much less education than male farmers. Some 84 percent of female farmers have no education; 14 percent have only primary education and less than 2 percent have preparatory education.

> ***Materials***: *Should be designed for low literacy levels, since seven in ten male farmers and virtually all female farmers have primary or less education.*

The mean number of household members was 9.6. As expected, Upper Egypt households have more members than Delta households. Female farmers live in households with fewer members. We also looked at the number of children in the household because GreenCOM/WCU intends to distribute materials through schools. The mean number of children under 16 in the household was 2.5 for male farmers and 1.4 for female farmers,

significantly less than in male farmers' households. The mean number of children for male farmers differs significantly by region, from 2.0 in the West Delta to 2.9 in Middle Egypt.

Table 3.1: Percent distribution of the farmers by background characteristics by region and sex, KAP Survey 1998.

Variables & Category	Region					Total	Female
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Age							
> 35	17.9	12.0	16.1	23.9	16.7	17.1	8.5
35 – 44	23.7	24.3	28.2	18.3	21.7	23.4	23.4
45 – 54	27.7	30.5	29.4	25.2	25.1	27.7	33.5
55 – 64	19.0	15.7	15.9	18.8	20.6	17.8	20.7
65 +	11.7	17.5	10.5	13.9	15.9	14.0	13.8
Mean age of farmer	46.9	49.4	46.8	47.1	48.9	47.9	49.7
Education							
Never Attended School	37.6	55.0	64.1	46.0	54.8	52.7	84.6
Primary	32.1	26.4	20.0	30.8	17.2	24.9	13.8
Preparatory	7.3	4.8	3.7	3.3	3.7	4.4	1.6
Secondary	16.1	9.5	7.0	16.7	15.6	12.6	0.0
Upper intermediate	2.2	0.9	1.4	0.5	1.6	1.3	0.0
University	4.7	3.4	3.7	2.6	7.1	4.2	0.0
Marital Status							
Single	10.2	3.4	3.7	5.9	7.1	5.7	2.1
Married	88.3	94.3	93.9	92.0	90.2	92.1	23.4
Widowed	1.1	2.3	2.1	1.8	2.6	2.0	71.3
Divorced	0.4	0.0	0.2	0.3	0.0	0.2	3.2
Mean number of household members	9.4	9.0	9.1	10.2	10.3	9.6	6.1
Mean number of children under 16	2.0	2.3	2.8	2.9	2.4	2.5	1.4
Have children attending school	82.5	70.0	75.8	75.3	70.4	74.2	54.3
Among those with children in school							
Do schoolchildren bring materials about agriculture and irrigation?							
Yes	25.2	32.5	27.8	23.2	22.9	26.5	16.7
No	68.1	48.1	45.7	55.3	48.1	52.2	45.1
Don't know	6.6	19.5	26.5	21.5	28.9	21.2	38.2
Total	274	440	429	389	378	1910	188

About 3 out of 4 children are currently attending school in the households headed by male farmers; decreasing to 1 out of 2 in households headed by female farmers. Farmers living in households with children attending school were asked if children bring home printed materials about agriculture and irrigation. Twenty-seven percent of the male farmers and 17 percent of female farmers said yes. It is interesting to note that substantial proportions of farmers (21 percent) didn't know whether their schoolchildren brought home such materials and 52 percent said that their children did not bring house such material.

3.2 Household Environment and Possessions

Table 3.2 presents the distribution of households by selected housing characteristics, including the source of drinking water, type of sanitation facilities and garbage disposal. These are important determinants of the health status of household members, and can also be used as indicators of the socioeconomic status of households.

Overall, 96 percent of male farmers have electricity in their houses, with only small differences by region. Two-thirds of these households have access to piped water, with significant variation by region. In the West Delta, only 31 percent of male farmers have access to piped drinking water, compared to 73 percent in Upper Egypt.

Around 80 percent of the male farmers' households have a traditional toilet with bucket flush, with significant but small differences among regions. Only 8 percent of male farmers report that they are in households with pit toilets, although this percentage is a relatively high 16 percent in Upper Egypt. The pattern is similar for households headed by female farmers.

Table 3.2 also presents the farmers' standard of living index (SLI)[1]. The mean value of the index is 10.5 for male farmers and 7.2 for female farmers, suggesting that female farmers' standard of living is significantly lower than that of male farmers. The difference between the SLI of farmers by region, location of *mesqa* and location of land were investigated. The mean SLI of farmers at the beginning of a canal was significantly higher than that of farmers at the end of a canal (10.7 compared to 10.3 – significant at $p = 0.03$), but the difference was not significant by position of the land on the *mesqa*.

Just over two-thirds of male farmers (69 percent) mentioned that they use wastes and garbage as natural fertilizers, with some differences among regions. West and Middle Delta farmers are more likely to use wastes as natural fertilizer than other regions; while East Delta farmers are the least likely to do so. Around 7 percent throw wastes in *mesqas*, canals or drains potentially causing water pollution and reducing the amount of high-quality water available.

[1] The household Standard of Living Index (SLI) was created from a set of variables related to housing conditions and ownership of consumer durables, livestock and farm equipment. The housing conditions included in the index and their scoring are summarized as follows - One point for having each of: electricity, piped drinking water, modern flush toilet, radio, B&W TV, color TV, refrigerator, tractor, cultivator, savings book and account in a bank. For livestock owned the number of cows and buffaloes were added together and number of points equal to the total cows and buffaloes was given. If the farmer has 7 or more cows and buffaloes he was given 7 points only for this item. Half a point also was given to any farmer having one, two or three sheep or goats and one point if he had more. Amount of land owned was also included in the index. Almost one tenth (first decile) of farmers owned no land, and were given no points, the second decile were given one point and so on. After calculating the SLI, the sample was divided into 3 groups: the lowest third (Low), the middle third (Medium), and the highest third (High). The cut points were taken from the distribution of the total.

Table 3.2: Percent of farmers by housing characteristics and standard of living by region and sex, KAP Survey 1998.

Variables & Category	Region					Total	Female
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Have Electricity	99.3	93.0	97.0	95.6	98.4	96.4	88.8
Source of drinking water							
Piped Water	30.7	42.0	49.4	57.6	73.3	51.4	41.5
Public Tap	2.2	17.0	33.9	13.1	1.3	14.6	26.1
Well at Home	49.3	23.4	7.5	20.3	22.5	22.7	19.1
Public Well	17.9	10.9	1.9	9.0	2.6	7.9	11.7
Other	0.0	6.5	8.4	0.0	0.3	3.5	1.6
Kind of toilet facility							
Modern flush toilet	8.4	4.1	1.6	3.6	5.6	4.3	2.1
Traditional with tank flush	2.6	14.5	5.8	2.1	3.7	6.2	9.0
Traditional with bucket flush	88.3	70.0	89.7	80.2	74.9	80.1	73.9
Pit toilet / Latrine	0.7	11.1	2.3	8.5	15.6	8.0	9.6
Other	0.0	0.2	0.5	5.7	0.3	1.4	5.3
Standard of Living Index (SLI)							
Low	30.6	32.7	32.9	39.6	48.1	36.9	68.6
Medium	43.1	40.0	44.3	37.8	33.6	39.7	23.4
High	26.3	27.3	22.8	22.6	18.3	23.4	7.9
Mean	11.2	10.9	10.7	10.2	9.6	10.5	7.2
Garbage disposal (multiple responses permitted)							
In any empty area	10.2	6.8	33.3	18.3	20.6	18.3	25.0
In the street	3.3	6.4	18.4	1.3	5.6	7.4	10.6
In the *mesqa*	0.0	1.8	2.8	0.3	0.0	1.1	2.1
In the canal	1.5	0.9	3.3	1.3	2.1	1.8	4.3
In the drain	2.9	5.7	6.1	3.1	0.3	3.8	8.5
As natural fertilizer	81.4	80.0	45.7	78.1	64.6	69.1	52.1
Collected by garbage truck	8.4	4.1	4.7	6.4	6.6	5.8	1.1
Traditional stove	6.2	4.5	15.6	6.7	14.8	9.7	12.2
Other	2.2	1.6	5.8	3.2	5.3	3.7	1.0
Total	274	440	429	389	378	1910	188

Table 3.3 provides information on household ownership of durable goods and other possessions. With regard to durable goods in households headed by male farmers, almost 8 of every 10 own a television (color or black and white) and more than 7 in 10 own a radio. Around 4 in 10 own a refrigerator, however, West Delta household are more likely to own TV and radio. Upper Egypt households have slightly more refrigerators than other regions.

***Communication channels**: 80 percent of male farmers own television sets, according to television ownership patterns. 76 percent own radios.*

Table 3.3 also includes information on household ownership of animals and agricultural equipment. Overall, around half of the male-headed households own cows, nearly two-thirds own buffaloes, and only one-quarter own sheep, with significant variations among regions. Only a small proportion of male farmers own tractors, 6 percent overall, while almost half own diesel water pumps and 16 percent own cultivators.

Reflecting the lower standard of living of female farmers, these women own fewer durable goods and agricultural equipment in every category: fewer goods in their homes, fewer animals and less equipment.

Table 3.3: Percentage of farmers owning household durable goods and agricultural equipment by region and sex, KAP Survey 1998.

Variables & Category	Region					Total	Female
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
TV	92.0	81.6	83.1	78.7	82.8	83.0	64.4
Refrigerator	37.2	35.5	39.6	30.8	47.1	38.0	18.6
Radio	77.0	80.0	80.9	72.0	67.2	75.6	53.7
Animals owned							
Cows	62.1	50.5	53.2	60.9	20.9	49.0	31.9
Buffaloes	69.7	74.1	51.0	53.2	63.8	62.0	43.1
Sheep	26.3	27.3	24.3	26.0	24.1	25.6	18.1
Tractors	9.1	3.0	7.7	5.9	5.6	6.0	1.6
Diesel pump	65.7	58.2	51.0	33.2	24.1	45.8	30.1
Cultivator	26.6	28.4	14.6	6.4	4.8	15.9	5.9
Total	274	440	429	389	378	1910	188

3.3 Land Holdings

The distribution of farmers by the land they cultivate is presented in Table 3.4. Just over a quarter of male farmers cultivate less than one feddan, and the same proportion cultivate 1-2 feddans. In comparison, 59 percent of female farmers cultivate less than one feddan. It is interesting that despite the low average area cultivated, still one in ten male farmers cultivate six or more feddans. Female farmers cultivate significantly less land on average than male farmers: 1.3 feddans compared to 3.2 feddans. The differences by region are not statistically significant.

> ***Target audiences:*** *Since female farmers cultivate only a small fraction of the farmland in Egypt, it may be more cost effective for GreenCOM to focus on modifying the irrigation behaviors of male farmers.*

When we look at area of land owned the first thing to note is that 12 percent of male farmers and 14 percent of female farmers own no land at all. Almost a third of male farmers and

just over half of female farmers own less than one feddan. The differences by region are not statistically significant.

Table 3.4 : Percent distribution of farmers by amount of land cultivated and owned by region and sex, KAP Survey 1998.

Variables & Category	Region					Total	Female
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Cultivated area							
<1 feddan	21.2	23.0	18.6	28.2	39.0	26.0	58.5
1 - 2 feddans	28.8	25.5	31.2	20.2	25.7	26.2	18.1
2 – 4 feddans	32.8	23.9	29.1	30.2	17.8	26.4	16.5
4 – 6 feddans	6.9	14.5	10.3	11.1	9.0	10.7	4.8
6 + feddans	10.2	13.2	10.7	10.3	8.5	10.7	2.1
Mean (in feddans)	3.4	3.3	2.7	3.7	3.0	3.2	1.3
Owned area							
None	12.4	16.4	12.8	10.6	6.4	11.9	13.8
<1 feddan	27.0	28.9	22.6	32.0	44.3	30.9	53.7
1- 2 feddans	27.0	17.3	27.7	17.8	19.1	21.5	14.9
2 – 4 feddans	20.1	16.8	22.1	25.6	17.0	20.3	11.7
4 – 6 feddans	5.8	12.0	7.7	5.4	6.1	7.7	4.3
6 + feddans	7.7	8.6	7.0	8.5	7.2	7.8	1.6
Mean (in feddans)	2.5	2.3	2.1	2.9	2.6	2.4	1.2

Chapter 4

Farmers' Knowledge of Water, Irrigation and Agriculture

Farmers make decisions about their irrigation practices based on their knowledge. For example, a farmer who does not know about short duration varieties of rice would probably not plant them; likewise, a farmer who does not know that leveling his land by laser could pay off in terms of lower irrigation costs probably would not seek to use a laser. Hence, it is important that the Ministry understand farmers' knowledge of water, irrigation and agriculture before they can attempt to modify farmers' use of water. Chapter 4 presents farmers' responses to questions about their knowledge of national water issues, methods of irrigation and the rice policy. In addition to differentials by region, in this section we also highlight differentials by education so that communication interventions can be effectively targeted.

4.1 Knowledge of National Water Issues

Table 4.1 presents the distribution of farmers (male and female) and the wives by their knowledge of the water situation in Egypt. Farmers were asked about the main source of water, the countries that share Nile water with Egypt, Egypt's quota of water from the Nile, the likelihood of an increased quota, the scarcity of water in Egypt and the largest agricultural projects.

More than three-fourths of male farmers (78 percent) knew that the main source of water is the Nile, while only 38 percent of female farmers and 50 percent of farmers' wives knew this fact. Virtually all male farmers and almost all women interviewed knew that agriculture consumes the most water in Egypt.

> ***Message**: The Nile is the main source of water in Egypt.*

Another interesting measure for the Ministry is to know whether farmers are aware of major national agricultural projects: interesting because knowledge of these major projects may make farmers aware of the increasing demand for water, and because the Ministry may wish farmers to be aware of the work they are undertaking in order to provide water for the nation. When asked if they could name the biggest agricultural development projects in

Egypt, 54 percent of male farmers named Toushka, which is under development, compared to 14 percent of female farmers and 23 percent of wives. In comparison, only 15 percent of male farmers named the Salam Canal, which has been opened, and virtually no female respondents named it. In fact, most female respondents and 43 percent of male respondents could not name any major agricultural project.

> ***Message:*** *The government is constructing several major irrigation and agricultural projects and has a plan to provide water to them.*

Respondents were not knowledgeable about the large number of countries which share the Nile and which therefore have their own growing needs for water. Virtually no respondents knew that there are ten countries sharing the Nile, and the majority of all respondents said that they didn't know. The average number of countries was half the actual number.

> ***Message:*** *Ten countries share the water of the Nile and there are many implications for Egyptian farmers.*

Another key piece of knowledge is whether there is any fluctuation in the amount of water available. Most male farmers (61 percent) knew that the amount of water was fixed, but a substantial proportion, 29 percent, didn't know whether it was fixed or variable. In contrast, most wives and female farmers didn't know, while around 29 percent knew that the amount of water was fixed. Since a fixed water supply has dramatic implications for a growing population, it is important for farmers to know that the amount of water is fixed.

> ***Message:*** *The amount of water available is fixed.*

When asked if they thought Egypt could negotiate a larger quota of water, more than half of male respondents said they thought Egypt could do so, while most females, whether farmers or wives, said they did not know.[1] This may be of interest to the Ministry because it plays a role in farmers' understanding of the likelihood of an upcoming water scarcity.

> ***Message:*** *It is unlikely that Egypt can negotiate a higher quota of water.*

Finally, when respondents were asked about the possibility of water scarcity in the future, three interesting patterns emerge. First, male farmers are much more knowledgeable about the possibility than female farmers and wives: around a third of male farmers expect a problem in the future compared to around 10 percent of female farmers and wives. Second, substantial proportions of respondents say that they are definitely not

[1] The following three questions were asked only of respondents who knew that the Nile was the main source of water.

Table 4.1: Percent distribution of farmers' knowledge about water situation by region and sex, KAP Survey 1998.

Variable & Category	Male						Female	
	Region					Total	Wives Subsample	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt			
Main source of water in Egypt								
Nile	78.1	75.7	77.6	73.0	85.7	78.1	50.1	37.8
Other answer	21.5	21.6	22.1	23.9	13.2	20.6	45.1	56.9
Don't know	0.4	2.3	0.2	2.6	1.1	1.4	4.2	4.8
Sectors consume more water								
Households	7.3	1.4	1.6	1.5	4.0	2.8	1.1	3.2
Industry	1.5	0.2	0.2	0.5	1.3	0.7	0.0	1.6
Agriculture	88.3	95.5	92.5	95.6	89.9	92.8	88.2	80.3
Don't know	2.9	3.0	5.6	2.3	4.5	3.7	10.4	14.9
Agricultural projects (multiple responses possible)								
Toushka	53.3	53.6	52.9	63.5	47.4	54.2	22.5	14.4
El-Salam Canal	15.7	13.0	18.8	15.7	12.7	15.2	3.0	2.7
East El-Ewynat	1.5	0.7	0.0	3.3	2.6	1.6	0.0	0.0
Other	7.3	1.6	1.4	3.6	6.9	3.8	0.8	0.5
Don't know	44.2	44.8	42.7	35.0	50.0	43.3	73.6	84.9
Scarcity of water in future								
Serious	32.8	22.5	23.8	17.5	12.4	21.2	4.5	8.5
Not serious	19.3	8.6	6.8	14.4	13.2	11.8	4.5	1.6
No problem	19.7	20.7	23.8	23.1	29.9	23.6	22.8	13.8
Don't know	28.1	48.2	45.7	45.0	44.4	43.4	68.2	76.1
Total	274	440	429	389	378	1910	355	188
Number of countries sharing the Nile with Egypt								
< 9	47.8	22.7	33.6	33.2	31.0	32.7	14.9	20.7
9	1.1	4.1	3.3	2.1	1.3	2.8	0.3	1.1
10	2.2	1.6	1.4	3.1	1.6	2.1	0.0	1.1
11 +	1.1	0.9	1.6	0.5	1.3	1.2	0.3	1.6
Don't Know	47.8	70.7	60.1	61.2	64.8	61.4	84.5	75.5
Mean (among valid responses)	4.5	6.3	5.5	5.4	5.2	5.4	5.3	*
Amount of water for Egypt								
Fixed amount	67.4	57.5	66.7	61.9	54.8	61.2	28.4	29.9
Variable amount	9.8	11.1	14.4	8.0	6.2	10.0	2.7	11.7
Don't know	22.8	31.3	18.9	30.1	39.1	28.8	68.8	58.4
Can Egypt negotiate higher quota of water								
Yes	70.2	58.4	61.6	52.8	47.7	57.4	23.1	32.5
No	8.4	11.1	6.0	14.3	8.9	9.7	2.7	3.9
Don't know	21.4	30.4	32.4	32.9	43.4	32.9	74.2	63.6
Total	215	332	333	286	325	1491	71	178

* Too many don't knows to calculate a mean.

expecting a problem in the future: around a quarter of male farmers and wives and 14 percent of female farmers. Third, the bulk of respondents simply did not know whether there was likely to be a problem in the future or not.

> ***Message***: *There is a strong possibility of an upcoming water shortage and need to use water more efficiently.*

Table 4.2 and Figure 4.1 present the percentage distribution, by education level, of farmers' knowledge of various aspects of the water situation in Egypt. Education plays a significant role in every knowledge question. One of the main effects of increasing education is to reduce the proportion of "don't know" responses.

More than 90 percent of male farmers whose level of education is preparatory or higher knew that the Nile is the main source of water in Egypt, compared with only 69 percent of farmers with no education. The proportion of uneducated farmers who identified Toushka as an agricultural project is half the proportion of farmers with preparatory or higher education. This is interesting, because most farmers have probably heard about this project on television, suggesting that television coverage may have been more effective in reaching better educated farmers or they get information from print materials.

Education makes a significant difference to knowledge of the number of countries sharing the Nile, but even among those who are able to suggest a specific number, the vast majority did not know the correct number of countries. The mean number of countries cited does not differ significantly by education level.

There is an interesting pattern on the question of negotiating an increased quota. With increasing education, a falling proportion of respondents said "don't know," but simultaneously an increasing proportion said yes as well as no.

What do the best-educated respondents conclude from their knowledge of the following four key facts?

1. 98 percent know that the main source of water is the Nile.
2. 88 percent know of a big agricultural project, which presumably will need water.
3. 79 percent know that the amount of water available is fixed.
4. 66 percent know that Egypt cannot negotiate a larger quota of water.

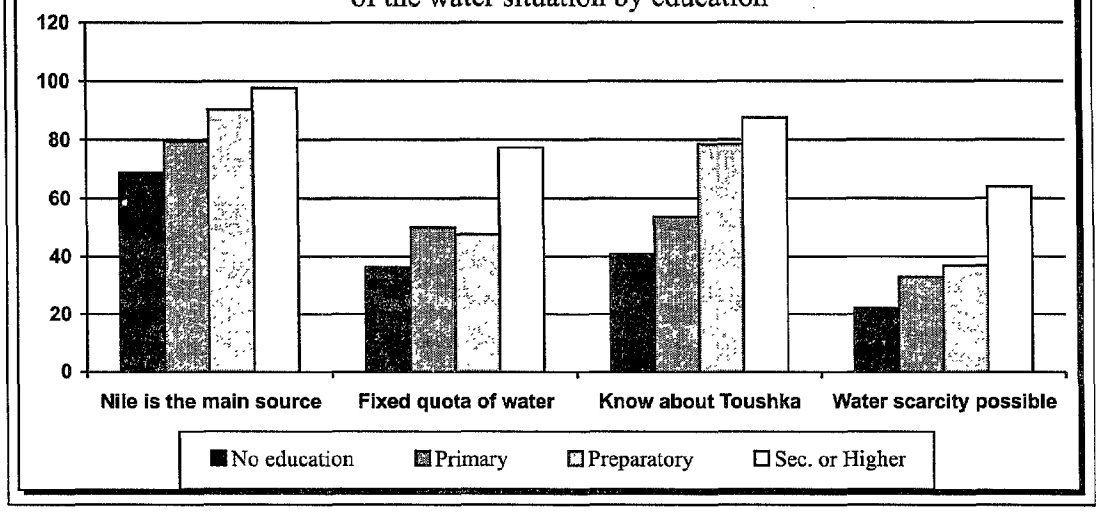
It is surprising to note that given these indicators of an impending water scarcity, only 40 percent anticipate a serious water problem and 24 percent anticipate a less serious water problem. This suggests that the audience in a communication intervention may not come to the desired conclusion when faced with a set of indirect messages.

> ***Message***: *The possibility of water scarcity is real.*

Table 4.2: Percent distribution of male farmers' knowledge about water situation in Egypt by education and sex, KAP Survey 1998.

Variable & Category	Male				Total
	Education				
	No Education	Primary	Prep.	Sec. Or Higher	
Main source of water in Egypt					
Nile	69.4	79.7	90.5	98.0	78.1
Other answer	29.0	18.4	9.5	1.7	20.6
Don't know	1.6	1.9	0.0	0.3	1.4
Sectors consume more water					
Households	1.7	3.8	4.8	4.3	2.8
Industry	0.6	0.6	2.4	0.6	0.7
Agriculture	92.3	92.8	91.7	94.2	92.8
Don't know	5.4	2.7	1.2	0.9	3.7
Agricultural projects (multiple responses possible)					
Toushka	40.9	53.7	78.6	87.5	54.2
El-Salam canal	9.9	13.1	10.7	34.8	15.2
East El-Ewynat	0.4	1.5	0.0	5.5	1.6
Other	2.9	4.0	4.8	6.1	3.8
Don't know	55.7	44.6	21.4	10.1	43.3
Scarcity of water in future					
Serious	14.4	20.2	31.0	40.0	21.2
Not serious	7.7	12.8	6.0	24.1	11.8
No problem	24.0	26.3	32.1	16.5	23.6
Don't know	53.9	40.6	31.0	19.4	43.4
Total	1006	475	84	345	1910
Number of countries that share Nile water with Egypt					
< 9	19.1	31.9	43.3	5.5	32.7
9	0.7	1.1	1.3	9.3	2.8
10	1.0	1.6	2.6	4.8	2.1
11 +	1.1	1.1	1.3	0.9	1.2
Don't know	78.0	64.4	51.3	25.7	61.4
Mean (among valid responses)	5.3	5.0	4.8	5.7	5.4
Amount of water for Egypt					
Constant amount	52.4	63.1	52.6	79.2	61.2
Varied amount	9.3	9.0	14.5	11.6	10.0
Don't know	38.3	27.9	32.9	9.2	28.8
Can Egypt negotiate a higher quota of water					
Yes	51.6	60.2	60.5	65.9	57.4
No	4.6	7.7	10.5	22.3	9.7
Don't know	43.9	32.1	28.9	11.9	32.9
Total	1005	475	84	345	1910

Figure 4.1
Percent distribution of farmers according to their knowledge of the water situation by education



4.2 Knowledge about Irrigation

Tables 4.3 and 4.4 present the percentage distribution of farmers by their knowledge of irrigation: the first table by region and the second by education.

Water User Associations

Farmers' awareness of Water User Associations (WUA) is very small (3 percent or less of male farmers, depending on region and 0.5 percent of female farmers). In fact, at the time of the fieldwork, a total of 2,802 *mesqa*-level WUAs were in some stage of formation, and one branch federation had been formed at the branch canal level. All 2,802 WUAs were in the Irrigation Improvement Project areas, which encompass 130,000 feddans of a total of 7.5 million feddans of irrigated land in Egypt, or 1.7 percent of the agricultural land. Comparing the 1.7 percent coverage of WUAs to 3 percent awareness among male farmers suggests the proportion who have heard of WUAs is realistic and may reflect some spreading of knowledge by word of mouth.

> ***Message:*** *WUAs are being established throughout the country to help farmers communicate with the Ministry and resolve problems at the mesqa and branch level.*

Reducing Water Consumption

When farmers were asked whether they have any idea how to use less water in irrigation, only 20 percent of male farmers and 4 percent of female farmers had ideas about how to irrigate with less water. Only three main methods were suggested and by small proportions of respondents: irrigating the field one section at a time, cultivating on the furrow, and spray or drop irrigation. Table 4.4 shows distinct increases in knowledge about ways to reduce water use among better-educated farmers.

> ***Message:*** *There are many different ways that farmers can use less water to irrigate.*

Night Irrigation

When farmers were asked about the advantages of irrigating at night, almost half of male and female farmers (47 and 49 percent respectively) mentioned that less water was required for night irrigation. If we look at the proportion of respondents who mentioned either reduced water requirement or reduced evaporation, the proportion reaches 57 percent (not shown in table).[2] There were significant differences by region, ranging from 28 percent in West Delta to 67 percent in East Delta. Minor differences exist by level of education, suggesting that this is knowledge gained in practice by all farmers, regardless of their level of education. It may also suggest that there are actually different levels of benefit to night irrigation by region. Around one-tenth of them said there was no advantage, particularly in Upper Egypt. (More than half of farmers mentioned the coldness of land by night/plants not falling down as an advantage)

> ***Message:*** *Less water is required for night irrigation than for irrigation in the daytime.*

When farmers were asked about the disadvantages of irrigating at night, 59 percent said there were no problems. There were only two main disadvantages for most farmers. First, the inability to see water at night was mentioned by one-fifth of farmers. For male farmers, the second leading problem was interrupted sleep (13 percent) and for female farmers, it was fearfulness (11 percent). Table 4.4 suggests that better-educated male farmers found night irrigation more problematic than less-educated farmers.

Land Leveling

One method, which might improve the efficiency of irrigation, is to use improved methods of land leveling. Farmers were asked about method of land leveling. Virtually every farmer levels his or her land, using any combination of four means: by hand, by cultivator, by mechanical cultivator, or by laser (see Table 6.1). The laser is the most effective, but most expensive and not cost-effective for most small farmers. Knowledge of better methods of land leveling is of interest to the Ministry as it considers whether, for example, the WUAs might be a means of helping farmers obtain the resources they need to use improved methods of leveling.

Farmers were asked whether another method of land leveling might increase production. When we look at the responses of farmers who use only one method of land leveling,[3] 55 percent of those who level by hand said no, 65 percent of those who level by cultivator said no, 82 percent of those who level by mechanical cultivator said no, and 100 percent of those

[2] This percentage is reached by adding the two percentages in the table, then subtracting those cases who cited both advantages to avoid double-counting them.

[3] A total of 1,614 male farmers use only one method of land leveling. Among female farmers, 156 respondents use only mechanical cultivators.

Table 4.3: Percent distribution of farmers' knowledge about irrigation situation in Egypt by region and sex, KAP Survey 1998.

Variable & Category	Male					Total	Female
	Region						
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Knowledge of Water User Association	5.8	3.2	1.6	1.5	2.1	2.7	0.5
Know how to use less water	24.1	22.3	13.8	12.6	30.1	20.2	4.3
Among those who know how to use less water							
How exactly might they use less water (multiple responses)							
Irrigating field one part at a time	15.3	6.8	4.0	3.9	20.9	9.6	2.1
Cultivating on furrow	11.7	17.5	2.8	1.8	3.2	7.3	1.1
Using spray or drop irrigation	1.5	2.5	1.2	4.6	5.6	3.1	1.1
Irrigating at night	1.1	0.7	1.6	0.8	0.0	0.8	0.0
Leveling the land	0.4	0.2	1.6	0.8	0.8	0.8	0.0
Cleaning interior Mesqa	0.0	0.2	0.9	0.3	1.3	0.6	0.0
Watering only as crops need it	0.0	0.0	0.9	0.5	0.0	0.3	0.0
Changing crops	0.0	0.5	0.0	0.3	0.3	0.2	0.0
Other	0.0	0.2	0.9	1.3	1.1	0.7	0.0
Advantages of night irrigation							
No advantages	16.4	3.9	3.7	13.6	23.0	11.4	18.6
The required water at night is less	28.1	55.9	67.1	40.1	33.6	46.8	48.9
Decreased evaporation	32.8	3.6	5.1	15.7	12.4	12.4	2.1
Land is cold/plants don't fall down	51.8	63.2	47.8	64.0	40.7	53.8	39.4
Doesn't cause problem with other farmers	0.4	3.4	11.1	0.3	1.1	3.6	1.1
Other	0.0	0.5	0.7	0.5	2.9	0.9	3.2
Don't know	0.0	0.0	0.5	1.0	4.5	1.2	3.2
The problems of irrigation by night							
No problem	60.9	33.6	60.1	71.0	75.7	59.4	56.4
Inability to see water	22.3	52.5	20.3	10.8	5.6	23.1	21.8
Can't sleep well	18.6	16.8	22.6	1.5	5.0	12.9	6.9
Other farmers steal water	0.7	3.0	4.7	1.3	1.6	2.4	4.3
Fear of monsters and thieves	4.4	0.5	0.9	17.2	6.6	5.8	10.6
Humidity	7.3	7.7	4.0	0.0	2.6	4.2	5.3
Lack of workers	1.8	3.2	1.2	0.5	0.5	1.5	1.6
Unsafe	0.0	0.0	0.0	2.3	0.0	0.5	0.0
Insufficient water	1.1	0.0	0.7	0.3	0.5	0.5	0.0
Requires more effort	0.0	1.4	0.2	0.0	0.0	0.4	0.0
Other	0.0	0.9	0.5	0.3	1.1	0.6	2.1
Don't know	0.0	0.0	0.2	1.3	5.8	1.5	3.2
Total	274	440	429	389	378	1910	188

who level by laser said no. Among female farmers, 98 percent of those who level by mechanical cultivator said no.

> ***Message:*** *Farmers who level by hand could improve production by leveling by cultivator.*

Table 4.4: Percent distribution of male farmers' knowledge about water situation in Egypt by education and sex, KAP Survey 1998.

Variable & Category	Male				Total
	Education				
	No Education	Primary	Prep.	Sec. Or Higher	
Knowledge of Water User Association	1.5	3.2	7.1	4.3	2.7
Know how to use less water	12.3	25.5	20.2	35.6	20.1
Among those who know how to use less water					
How exactly might they use less water (multiple responses)					
Irrigating at night	0.4	0.8	2.4	1.7	0.8
Cleaning interior mesqa	0.7	0.0	0.0	1.2	0.6
Using spray or drop irrigation	0.3	2.3	1.2	12.8	3.1
Irrigating the field one part at a time	7.6	11.6	10.7	12.5	9.6
Cultivating on furrow	3.8	12.6	8.3	10.1	7.3
Leveling the land	0.5	1.1	2.4	0.9	0.8
Applying water only as crop needs it	0.3	0.0	0.0	0.9	0.3
Changing crops	0.0	0.4	0.0	0.6	0.2
Other	0.2	0.0	1.2	2.0	0.7
The advantages of irrigating at night					
No advantages	12.1	11.4	8.3	10.1	11.4
The required water at night is less	49.9	43.6	47.6	42.0	46.8
Decreased evaporation/transpiration	10.7	13.3	10.7	16.2	12.4
Land is cold/plants don't fall down	47.9	57.5	66.7	63.2	53.8
Fewer problems with other farmers	4.3	3.8	0.0	2.3	3.6
Other	1.2	0.6	1.2	0.6	0.9
Don't know	1.8	0.8	0.0	0.3	1.2
Problems of irrigating at night					
No problem	62.9	58.9	61.9	49.6	59.4
Can't sleep well	11.9	12.4	14.3	16.2	12.9
Inability to see water	19.9	25.5	23.8	29.3	23.1
Other farmers steal water	3.0	1.7	0.0	2.3	2.4
Fear of monsters and thieves	4.0	6.3	3.6	10.7	5.8
Humidity	4.6	3.6	6.0	3.8	4.2
Lack of workers	1.3	0.8	0.0	3.2	1.5
Unsafe	0.3	0.6	0.0	0.9	0.5
Insufficient water	0.3	0.8	0.0	0.6	0.5
Requires more effort	0.3	0.2	1.2	0.6	0.4
Other	0.6	0.2	1.2	0.9	0.6
Don't know	1.9	1.3	1.2	0.6	1.5
Total	1005	475	84	345	1910

4.3 Knowledge of Rice Policy

It is important to measure farmers' knowledge of Ministry policies to verify how well farmers understand important policies, which the Ministry has implemented and communicated to them through television spots, district engineers and other means in order to reduce water use in irrigation. The main policy investigated in this survey is the rice policy.

As Table 4.5 shows, two-thirds of male farmers and about one-third of female farmers know why the Ministry limits rice cultivation. Almost all of those who said they knew the reason did know the correct reason: 57 percent of all male farmers and 30 percent of all female farmers knew that rice growing is limited because it takes a lot of water. Due to the regional differences in cropping pattern, there are substantial differences in knowledge at the regional level: farmers in Upper Egypt are much less knowledgeable on this point than those in the Delta, although there are still differences within the Delta. As expected, farmers with secondary or higher education are significantly more knowledgeable on this (68 percent) than farmers with no education (53 percent), as shown in Table 4.6.

> ***Message:*** *Rice growing is limited because of its high water consumption.*

Respondents were asked whether they knew which crops had high water requirements. Overall, about two-thirds of male and female farmers knew that rice requires a lot of water, with strong regional variations: every respondent in East Delta cited rice, compared to only 19 percent of respondents in Upper Egypt, where no respondent had ever grown rice.

> ***Message:*** *Rice is a high water-consumption crop.*

Farmers were asked whether they had heard of a short duration variety of rice.[4] Among rice farmers (ie. farmers who were currently growing or had ever grown rice), 63 percent of males and 59 percent of females had ever heard of such a variety. Even within the Delta, there is a strong regional variation, from 80 percent in West Delta to 54 percent in East Delta. Respondents were asked for the name of one such variety of rice, and about 45 percent of all rice farmers were able to give the correct name of one such variety, again with significant regional variation. Almost all Middle Delta rice farmers who said they knew of such a variety were able to give a correct name. Increasing education shows an obvious increase in the proportion who had heard of a short duration variety, but the pattern was not as clear with giving the correct name of such a variety (Table 4.6).

> ***Message:*** *There are new varieties of short duration rice.*

[4] Short duration varieties mature in less than the 160 days required by long duration varieties, as follows:

Giza 4000/177	120-125 days
Sakha 102	120 days
Giza 178	130-135 days
Sakha 101	140 days

Table 4.5: Percent distribution of farmers' knowledge about cultivating rice by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Know why the Ministry limits rice cultivation	80.7	67.5	81.1	60.7	42.1	66.0	31.4
What is the reason							
High water requirement	73.7	55.9	78.3	51.2	28.3	57.1	30.3
Raises water table	1.1	0.5	0.5	3.1	1.1	1.2	0.0
Decreases water salinity	1.5	5.9	0.5	2.3	1.6	2.5	0.5
To rotate crops	1.1	0.9	1.4	1.3	0.0	0.9	0.5
To maintain the quality of soil	0.0	1.1	0.5	0.0	0.3	0.4	0.0
For consumption and export	1.1	0.0	0.5	1.0	2.6	1.0	0.0
Needs big area	0.7	3.4	0.5	1.3	0.8	1.4	1.1
No suitable drainage	2.9	3.9	0.5	7.2	10.3	4.9	0.5
Soil is not suitable	0.4	0.2	0.2	1.0	1.6	0.7	0.0
Other	1.9	1.8	0.2	0.5	0.8	1.1	0.0
Know that rice consumes a lot of water	94.5	62.7	100.0	60.9	19.3	66.7	69.7
Total	274	440	429	389	378	1910	188
Among farmers who have ever grown rice							
Heard of a short duration variety of rice	80.2	65.1	54.0	15.8	--	62.7	58.7
Gave correct name of a short duration variety	46.7	60.4	40.6	0.5	--	45.4	45.7
Total	242	169	426	19	0	856	92

Table 4.6: Percent distribution of male farmers' knowledge about cultivating rice by education and sex, KAP Survey 1998.

Variable & Category	Male				Total
	Education				
	No Education	Primary	Prep.	Sec. Or Higher	
Know why the Ministry limits rice cultivation	60.8	66.1	75.0	78.3	66.0
What is the reason					
High water requirement	52.5	57.5	65.5	67.6	57.1
Raises water table	0.8	1.1	3.6	2.0	1.2
Decreases water salinity	1.8	2.9	0.0	4.3	2.5
To rotate crops	1.2	0.4	2.4	0.6	0.9
To maintain the quality of soil	0.3	0.8	0.0	0.3	0.4
For consumption and export	0.9	1.5	1.2	0.6	1.0
Needs big area	1.2	1.5	4.8	1.2	1.4
No suitable drainage	5.3	3.8	1.2	6.4	4.9
Soil is not suitable	0.4	0.6	1.2	1.4	0.7
Other	0.3	1.6	1.2	2.1	1.1
Know that rice consumes a lot of water	67.9	65.7	67.9	64.3	66.7
Total	1005	475	84	346	1910
Among farmers who have ever grown rice					
Heard of a short duration rice	58.1	66.7	72.5	73.1	62.7
Gave correct name of a short duration variety	43.7	45.5	55.0	49.6	45.4
Total	508	189	40	119	856

Chapter 5

Attitudes Toward Water Resources

A positive attitude toward water conservation is a prerequisite to modifying water use. Measuring attitudes is always difficult, whether directly or indirectly. In this section, we look at attitudes toward the Ministry, cost recovery and Water User Associations. We discuss differentials by region and education.

5.1 Attitudes Toward the Ministry

Table 5.1 looks at respondents' most pressing needs, and views of the Ministry. There are three main issues on farmers minds.[1] First, eight in ten male and female farmers said that they would tell a senior Ministry official that they need more water. Second, a quarter of male farmers and 12 percent of female farmers would tell a senior Ministry official that the canal needs cleaning. Third, 16 percent of male farmers and 7 percent of female farmers request that water arrive in the *mesqa* on schedule. Only 6 out of 100 male and 8 out of 100 female farmers said there was nothing they needed to convey to a senior Ministry official.

> ***Message:*** *Efforts to use water more efficiently will help to conserve water.*

Regionally, there is a clear difference between the Delta and Upper Egypt: Farmers in Upper Egypt have far less to discuss with senior Ministry officials than those in the Delta. Farmers in the East Delta have the most to discuss. They are especially concerned about the quantity of water available. By education, it is interesting to note that better-educated farmers are less concerned about the amount of water available to them than uneducated farmers, while they are more concerned about cleaning the canal and providing water on schedule.

> ***Target audience:*** *Farmers in the East Delta are especially concerned about the quantity of water.*

[1] The fieldwork was conducted at the end of April, when farmers were beginning to plant their summer crop, and they experience considerably more water problems in the summer than the winter.

Table 5.1: Percent distribution of farmers' attitudes toward the Ministry by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
What would you like to discuss with a senior Ministry official (multiple responses possible)							
Need more water	88.3	81.8	93.2	74.0	62.7	79.9	83.0
Clean canal	35.0	24.5	21.0	31.9	22.2	26.3	12.2
Provide water on schedule	15.3	30.2	9.3	7.2	15.3	15.8	7.4
Nothing	3.3	1.8	0.5	9.5	16.1	6.1	8.0
Sewage problems	1.1	0.9	3.3	2.1	1.1	1.7	0.5
Covering *mesqa*/canal	0.0	6.4	0.7	1.5	0.0	1.9	0.5
Other	2.9	4.8	3.2	4.4	7.5	4.7	7.5
Greatest concern for the future of irrigation (multiple responses possible)							
Water doesn't arrive	79.6	80.9	85.5	72.2	63.0	76.4	64.9
Availability of enough clean water	11.7	15.2	17.0	16.7	15.9	15.5	11.7
Nothing	4.4	5.0	2.8	11.8	11.6	7.1	12.2
Salinity of irrigation water	0.0	5.7	6.3	1.5	0.3	3.1	4.3
Cost of irrigation water	1.8	0.7	3.0	1.0	3.2	1.9	1.6
Covering the canal	0.7	3.4	0.9	2.1	0.3	1.6	0.5
Low levels at the High Dam	1.5	0.7	1.6	1.3	2.4	1.5	0.5
Other	2.2	7.0	4.6	5.9	12.8	6.3	12.7
Does the Ministry have an easy job providing water to farmers?							
Easy	26.6	35.0	26.3	36.2	46.0	34.3	43.1
Usually easy, sometimes hard	6.9	7.5	12.6	17.2	8.7	10.8	11.2
Hard and complicated	22.6	18.9	22.8	10.3	15.3	17.9	15.4
Very hard	43.8	38.2	37.8	36.2	28.0	36.5	25.5
Impossible to satisfy everyone	0.0	0.2	0.5	0.0	0.5	0.3	0.0
Don't know	0.0	0.2	0.0	0.0	0.8	0.2	4.3
Could the Ministry do a better job of water delivery?							
Yes	86.1	88.9	82.5	79.7	70.4	81.5	74.5
No	13.9	11.1	17.5	20.1	29.4	18.4	23.9
Don't know	0.0	0.0	0.0	0.0	0.3	0.1	1.1
Total	274	440	429	389	378	1910	188

When asked what was their greatest concern about irrigation in the future, three-quarters of male farmers and two-thirds of female farmers were again most concerned about the availability of water. A second concern, expressed by 16 percent of male farmers and 12 percent of female farmers, was that the water supply be sufficient and clean. Clearly water quality is not the main issue on farmers' minds. A small proportion of farmers had no concerns at all. Regionally and by education, the concerns were significantly different, although the general pattern was consistent.

Table 5.2: Percent distribution of male farmers' attitudes toward the Ministry by education, KAP Survey 1998.

Variable & Category	Male				
	Education				
	No Education	Primary	Prep.	Sec. Or Higher	Total
What would you like to discuss with a senior Ministry official (multiple responses possible)					
Need more water	82.9	81.7	77.4	69.7	79.9
Clean canal	23.6	22.3	32.1	38.2	26.3
Provide water on schedule	12.5	17.1	15.5	23.4	15.8
Nothing	7.1	6.3	6.0	3.2	6.1
Sewage problems	1.8	1.3	1.2	2.3	1.7
Covering *mesqa*/canal	0.4	4.2	2.4	3.2	1.9
Other	3.9	3.5	3.6	8.4	4.7
Greatest concern for the future of irrigation (multiple responses possible)					
Water doesn't arrive	76.2	77.5	77.4	75.4	76.4
Availability of enough clean water	16.4	12.2	10.7	18.8	15.5
Nothing	8.8	7.2	3.6	3.2	7.1
Salinity of irrigation water	4.1	2.1	2.4	1.7	3.1
Cost of irrigation water	2.2	1.7	1.2	1.7	1.9
Covering the canal	0.9	2.1	6.0	1.7	1.6
Low levels at the High Dam	0.4	1.1	2.4	4.9	1.5
Other	5.7	6.7	10.8	8.7	6.3
Does the Ministry have an easy job providing water to farmers?					
Easy	37.3	38.1	38.1	19.4	34.3
Usually easy, sometimes hard	10.7	12.2	6.0	10.1	10.8
Hard and complicated	16.5	15.8	20.2	24.0	17.9
Very hard	34.5	33.5	35.7	46.5	36.5
Impossible to satisfy everyone	0.4	0.2	0.0	0.0	0.3
Don't know	0.3	0.2	0.0	0.0	0.2
Could the Ministry do a better job of water delivery?					
Yes	78.7	81.9	82.1	89.0	81.5
No	21.3	17.7	17.9	11.0	18.4
Don't know	0.0	0.2	0.0	0.0	0.1
Total	1005	475	84	345	1910

When asked how easy they thought the Ministry's job was providing water to farmers, farmers were split: 54 percent of male farmers and 41 percent of female farmers said it was hard or very hard, while a third of male farmers and 43 percent of female farmers said they felt the Ministry has an easy job. Farmers in West Delta and better-educated farmers were more sympathetic toward the Ministry.

Finally, as a measure of customer satisfaction, respondents were asked whether they thought the Ministry could do a better job of water delivery. While 8 in 10 male farmers and 3 in 4 female farmers said yes, it is reassuring to note that about a fifth of all farmers felt that the Ministry could not do a better job than they are already doing.

5.2 Attitudes Toward Cost Recovery

The pretest version of the questionnaire asked respondents how much they would be willing to pay to keep the canal clear so that water would arrive on schedule, to ensure that the farmer would have enough water to irrigate his land and to ensure that the level of water would be high enough to irrigate his land. During the pretest, farmers refused vigorously to answer these questions, and they were dropped in favor of the broader questions that are analyzed here.

Farmers say that they are generally willing to share in costs. The study suggests that there is a high level of willingness among male farmers to share in the costs of improving the irrigation system, as shown in Tables 5.3 and 5.4. Female farmers are less willing to share in these costs. Overall, 76 percent of male farmers are willing to share in the costs of upgrading to provide continuous flow, and 73 percent of male farmers are willing to share in the costs of upgrading the drainage system. In comparison, only around half of female farmers are willing to share in these costs, possibly due to the fact that most female farmers have fewer assets than male farmers.

Table 5.3: Percent distribution of farmers' attitudes toward cost recovery by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Proportion willing to share in the costs of ...							
Upgrading the irrigation system to Provide continuous flow	79.9	83.4	81.4	80.5	55.8	76.4	50.0
Upgrading the drainage system	78.1	73.8	73.4	79.9	53.2	72.7	47.3
Total	274	440	429	389	378	1910	188

There are significant regional and educational differences among men. Farmers in Upper Egypt are significantly less willing to share in these costs, possibly because they experience fewer problems. Better-educated farmers are significantly more willing to share in these costs than less-educated farmers.

In addition, as shown in Table 5.5, 92 percent of men who are willing to join Water User Associations are willing to share in the costs of *mesqa* repair and maintenance. Only 75 percent of women who are willing to join WUAs are willing to share these costs. Regional differences are not significant, and educational differences are significant but small.

Table 5.4: Percent distribution of male farmers' attitudes toward cost recovery by education and sex, KAP Survey 1998.

Variable & Category	Male				
	Education				
	No education	Primary	Prep.	Sec. or higher	Total
Proportion willing to share in the costs of ...					
Upgrading the irrigation system to Provide continuous flow	72.8	78.3	80.7	82.9	76.4
Upgrading the drainage system	68.0	76.2	75.0	80.6	72.7
Total	1005	475	84	345	1910

5.3 Farmers' Attitudes Toward Water User Associations

Attitudes toward joining and participating

As discussed in Chapter 4, only 3 percent of farmers were aware of Water User Associations. Before answering additional questions about WUAs, the interviewer explained to each that:

> *Water User Associations exist in some parts of the country and function as follows. Farmers on one mesqa select a representative to the association, which meets regularly with the district irrigation engineer to determine the major repairs that need to be made. The association is also responsible for organizing regular mesqa maintenance and resolving conflicts.*

Table 5.5 shows that more than three-quarters of male farmers said they would like to participate, with the highest level observed in West Delta (91 percent) and the lowest level observed in Upper Egypt (65 percent). Female farmers were much less likely to say that they would join an association if one were formed nearby (only 37 percent).

> ***Message**: Water User Associations benefit farmers.*

There are significant educational differences, as shown in Table 5.6. Better-educated farmers are substantially more interested in participating than less-educated farmers.

Table 5.5: Percent distribution of farmers by attitude toward Water User Associations by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Would join if an association were formed nearby							
Yes	91.2	83.0	72.3	80.5	65.1	77.7	36.7
No	8.4	17.0	27.7	19.3	34.7	22.1	63.3
Among those who said they would participate							
Reasons for joining (multiple responses possible)							
Benefit of farmer/farmers	76.8	68.5	63.2	66.5	74.4	69.3	33.3
Benefit of land	50.0	45.8	42.6	38.3	29.7	41.6	34.8
Take care of *mesqa*	7.6	4.1	17.7	3.8	4.9	7.6	5.8
Solve water problems	47.6	50.7	61.6	62.3	45.5	54.0	60.9
Get information about irrigation	2.0	0.8	1.9	2.6	4.1	2.2	1.4
Complaints reach Ministry staff	2.4	2.5	4.5	7.7	11.4	5.5	5.8
Other	0.0	0.0	0.3	0.3	1.6	0.4	1.4
Among those who said they would participate							
Would participate in ...							
Planning improvements with the engineer	95.6	84.4	87.1	90.1	91.5	89.2	42.0
Setting regulations for the association	94.0	83.8	83.9	88.5	87.0	87.1	34.8
Electing representatives	96.4	93.2	95.8	91.7	91.9	93.7	69.6
Resolving conflicts between farmers	97.2	95.6	98.1	95.2	93.5	96.0	62.3
Sharing costs of *mesqa* maintenance	93.6	92.1	91.0	92.7	89.0	91.7	75.4
Among those who said they would not join							
Reasons for not joining (multiple responses possible)							
Won't benefit me	13.0	10.7	1.7	14.7	12.2	9.5	1.7
Farmer is not responsible	17.4	4.0	32.8	10.7	9.9	15.8	14.3
Too many problems	17.4	24.0	38.7	32.0	26.0	29.8	16.8
I am too old	26.1	30.7	26.9	40.0	29.8	30.7	38.7
I have no time	13.0	25.3	10.9	14.7	9.9	13.9	0.0
I have no problems	0.0	4.0	0.0	0.0	0.0	0.7	0.0
Small size of land	17.4	2.7	0.0	4.0	16.8	7.3	3.4
I am a woman	0.0	0.0	0.0	0.0	1.5	0.5	32.8
Other	0.0	1.3	1.7	2.7	0.8	1.4	0.0
Don't know	4.3	5.3	2.5	5.3	8.4	5.4	13.4
Total	274	440	429	389	378	1910	188

Among those who were interested in joining, the leading reasons cited were the farmers' benefit (69 percent), the opportunity to solve water problems (54 percent), and that the association would benefit the land (42 percent). These were the leading reasons by region, but in different orders: for example, in Upper Egypt, 30 percent of farmers felt that the association would benefit the land, compared to 50 percent of farmers in West Delta. By education, there were also differences but somewhat less striking than the regional differences. Female farmers cited the same main reasons for joining, although in different proportions. Only a third of female farmers cited the benefits that would accrue to farmers

and to the land, whereas 61 percent cited the opportunity to solve water problems. There was a high degree of interest among farmers in participating in specific tasks within the WUA, ranging from 96 percent of potential male members being willing to participate in solving problems to 87 percent of these respondents being willing to share in setting up association regulations. There was also a high degree of willingness to share in the costs of *mesqa* repair and maintenance. Most regional differences were not significant, while most educational differences were significant.

Table 5.6: Percent distribution of male farmers' attitudes toward Water User Associations by education, KAP Survey 1998.

Variable & Category	Male				
	Education				Total
	No education	Primary	Prep.	Sec. Or higher	
Would join if an association were formed nearby					
Yes	72.0	80.6	81.0	89.3	77.7
No	27.8	19.2	19.0	10.7	22.1
Don't know	0.2	0.2	0.0	0.0	0.2
Among those who said they would participate					
Reasons for joining					
(multiple responses possible)					
Benefit of farmer/farmers	64.8	76.2	73.5	70.8	69.3
Benefit of land	40.3	41.0	42.6	45.1	41.6
Take care of *mesqa*	7.5	5.7	11.8	9.4	7.6
Solve water problems	57.5	51.4	47.1	51.0	54.0
Get information about irrigation	0.7	1.8	5.9	5.2	2.2
Complaints reach Ministry staff	4.7	4.7	4.4	8.4	5.5
Other	0.3	0.3	0.0	1.0	0.4
Among those who said they would join					
Would participate in ...					
Planning improvements with the engineer	85.4	89.3	94.1	97.1	89.2
Setting regulations for the association	82.9	88.5	88.2	94.8	87.1
Electing representatives	91.4	93.7	100.0	97.7	93.7
Resolving conflicts between farmers	95.3	95.6	98.5	97.4	96.0
Sharing costs of *mesqa* maintenance	89.9	92.7	95.6	93.8	91.7
Among those who said they would not join					
Reasons for not joining					
(multiple responses possible)					
No benefit	8.6	11.0	12.5	10.8	9.5
Farmer is not responsible	15.8	17.6	31.3	5.4	15.8
Too many problems	28.3	28.6	31.3	43.2	29.8
I am too old	36.9	25.3	12.5	5.4	30.7
I have no time	10.0	17.6	12.5	35.1	13.9
I have no problems	0.7	1.1	0.0	0.0	0.7
Small size of land	7.5	6.6	6.3	8.1	7.3
I am a woman	0.4	0.0	6.3	0.0	0.5
Other	1.4	0.0	0.0	5.4	1.4
Don't know	5.4	6.6	6.3	2.7	5.4
Total	1005	475	84	345	1910

Among those who said they would not join a WUA if it were formed in their area, the leading reasons cited were that a WUA would entail too many problems, or that the

respondent felt he or she was too old to join. In addition, 16 percent of male farmers and 14 percent of female farmers felt that farmers were not responsible for the tasks that a WUA would undertake, and 14 percent of male farmers said they did not have time to join. The main reason female farmers gave for not wanting to join (63 percent of female farmers said they would not join) was that they were women, and presumably this would keep them from joining.

> ***Message:*** *All farmers are welcome to join Water User Associations, men and women.*

Conflict resolution among farmers at the *mesqa* level

Four questions were asked to examine conflict resolution procedures currently in place at the *mesqa* level. It is interesting to see which conflicts farmers resolve among themselves, and which ones are resolved with the intervention of groups – mainly the agricultural society. Respondents were asked if there was a penalty against a farmer for certain actions and, if so, what and who would administer that penalty. Respondents were permitted to list more than one person or organization responsible for administering the penalty. Results are shown in Table 5.7.

For three of these four infractions, more than half of the farmers said that a penalty would apply. If a farmer didn't contribute toward cleaning the *mesqa*, almost two-thirds of farmers said they would pay a monetary penalty, mainly administered by the agricultural society. If a farmer's tractor breaks a *mesqa* bridge, 55 percent said a penalty would apply, usually work, and usually administered by *mesqa* users. If a farmer sabotages another farmer's crop, farmers were united in saying that there would be a penalty, most often money, and usually administered by the police.

However, it is interesting that if a farmer takes more than his share of water, almost all farmers (90 percent) said that no penalty would apply. In the case that a penalty is applied, it is usually money, and usually administered by *mesqa* users. If farmers really lack a method of ensuring that every farmer takes his fair share of water, the Water User Associations might be positioned as a way to do so. At the regional level, it is fascinating that the only region where farmers apply a penalty to each other is in the East Delta. In other regions, farmers may not know exactly when a farmer has taken more than his fair share, but perhaps due to the fact that irrigation conditions seem to be especially bad in East Delta, 28 percent of farmers said that a penalty would apply.

As shown in Table 5.7, there is tremendous regional variation in procedures for handling conflicts. For example, if a farmer doesn't share in the cost of cleaning the *mesqa*, he will probably get away with it in Upper Egypt but probably won't get away with it in Middle Delta or East Delta. In case he is penalized, it will probably be money, but in Upper Egypt it will be the other *mesqa* users who fine him, whereas in Middle Egypt it will almost certainly be the agricultural cooperative.

If a farmer's tractor breaks a *mesqa* bridge, in only half of the cases is there likely to be a penalty and if there is one in West Delta it will probably be money, whereas in East Delta it will probably be work. In East Delta the penalty will be administered by *mesqa* users, and in West Delta it is more likely to be administered by the agricultural cooperative.

***Message**: Water User Associations can be a way to ensure that every farmer gets his fair share of water*

Table 5.7: Conflict resolution at the *mesqa* level by region, KAP Survey 1998.

Variable & Category	Male					
	Region					Total
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	
If a farmer doesn't share in the costs of cleaning *mesqa*						
There is a penalty	70.1	80.0	80.2	56.6	32.8	64.5
Among those who said there is a penalty						
Penalty is money	97.9	93.8	67.7	85.0	82.3	84.4
Penalty administered by Ag. Coop.	77.1	88.1	49.4	44.1	13.7	60.2
Penalty administered by *mesqa* users	7.8	10.2	51.5	42.7	72.6	33.4
If a farmer's tractor breaks a *mesqa* bridge						
There is a penalty	56.9	63.6	62.5	44.5	46.6	55.1
Among those who said there is a penalty						
Penalty is work	19.9	79.2	86.6	54.3	63.4	65.6
Penalty is money	76.9	19.0	12.3	30.1	24.6	28.6
Penalty administered by *mesqa* users	37.8	69.6	84.7	62.4	56.3	65.3
Penalty administered by Ag. Coop.	50.0	25.0	13.4	17.3	17.6	23.3
If a farmer sabotages another farmer's crop						
There is a penalty	95.3	92.7	98.6	93.8	91.5	94.4
Among those who said there is a penalty						
Penalty is money	82.0	66.9	37.8	57.8	74.6	61.9
Penalty administered by police	36.0	58.1	78.3	67.1	71.1	64.0
Penalty administered by Ag. Coop.	32.6	18.4	28.1	21.4	32.1	30.0
Penalty administered by *mesqa* users	18.4	18.9	12.1	4.9	6.1	11.9
If a farmer takes more than his share of water						
There is a penalty	5.1	4.8	28.4	7.5	3.2	10.4
Among those who said there is a penalty						
Penalty is money	*	*	54.1	*	*	52.5
Penalty administered by *mesqa* users	*	*	74.6	*	*	54.5
Penalty administered by Ag. Coop.	*	*	24.6	*	*	26.3
"Penalty administered by" is a multiple response variable.						
Total	274	440	429	389	378	1910

5.4 Attitudes Toward the Liberalization of Agriculture

The Government no longer determines the crop rotation or market prices and has also begun to reduce the subsidy on inputs. Farmers were asked about their opinions on these recent changes and the effect of these changes on their profit.

As shown in Table 5.8, only 11 percent of male farmers and 5 percent of female farmers changed their cropping pattern after these policy changes and, among those who changed, the main change was in cotton. Both these variables differed significantly by region. The highest proportion of farmers who changed a crop was in the Middle Delta (22 percent) and the lowest in East Delta (2 percent). Farmers who did not change their cropping patterns gave many reasons for not doing so. The main reason was the needs of household and livestock, followed by the fact that their current crops suit their land, the demands of agricultural rotation and the unsuitability of the land for other crops. These reasons differed by region: in West Delta, the main reason was agricultural rotation; in East Delta the land is unsuitable for different crops; and in Middle Egypt, the needs of the household and livestock are predominant.

These policy changes combined with the changes in the tenant law[2] have changed who is working the land and making irrigation decisions in 44 percent of cases, as reported by male farmers, and 33 percent as reported by female farmers. There is a significant variation by region, from a high of 68 percent in Middle Egypt to a low of 14 percent in Middle Delta.

Two-thirds of male farmers and just over half of female farmers welcome these changes, while substantial proportions of farmers do not welcome them: a quarter of male farmers and 17 percent of female farmers. Again, there are significant differences by region: 78 percent of farmers in East Delta welcome these changes compared to 50 percent in Middle Egypt.

These policy changes do not seem to have an effect on most farmers' profit margins: 62 percent of male farmers and 69 percent of female farmers report that their profit margins are unchanged. However, 16 percent of farmers do report increased profit margins. A full 22 percent report decreased profit margins. While these differences are significant by region, the general pattern remains the same.

Finally, among farmers whose profit did not increase, about a third of farmers said that they felt they would be able to increase their profits over time as they adjust to the changes. West Delta farmers were the most optimistic, while Middle Delta farmers were the least optimistic on this point.

[2] Land owners are now allowed to set private contracts with their tenant farmers stipulating the annual rent.

Table 5.8: Percent distribution of farmers by attitude toward the liberalization of agriculture by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Proportion who changed cropping pattern after policy changes							
Changed	14.6	22.3	2.3	10.0	4.2	10.6	4.8
Did not change	85.4	77.7	97.7	90.0	95.8	89.4	95.2
Among those who changed crops							
Crop changed							
Cotton	47.5	84.7	80.0	73.7	37.5	71.3	77.8
Other (16 crops)	52.5	15.3	20.0	26.3	62.5	28.7	22.2
Among those who did not change							
Reason for not changing crops (multiple responses possible)							
Current crops suit my land	48.7	37.7	39.1	62.0	55.8	48.4	29.6
Land unsuitable for other crops	14.1	48.5	80.4	21.4	14.1	38.8	32.4
Good income from current crops	15.0	2.6	0.7	15.7	21.8	10.6	0.6
Agricultural rotation	61.5	40.4	74.0	28.9	11.9	43.1	45.8
Needs of household and livestock	55.6	56.1	33.7	72.9	71.5	57.2	43.6
Holding is small	43.2	47.7	29.8	37.4	35.9	38.1	49.7
Don't know how to grow other crops	16.7	18.7	5.5	6.6	10.5	11.0	29.1
Other	2.6	3.2	1.0	1.7	2.2	2.1	4.5
Combined with the tenant law changes, policies have changed who is working the land and making irrigation decisions	63.9	14.4	40.3	67.9	57.4	43.7	33.0
Attitude toward these changes							
Welcome them	54.4	75.9	77.6	50.1	57.9	64.4	55.9
Don't welcome them	43.1	18.9	11.2	37.3	23.3	25.2	17.0
Risks are too great	0.4	2.5	0.9	4.4	3.7	2.5	1.1
Effect of changes on profit margin							
Increased	24.1	20.2	15.6	6.9	12.7	15.6	12.2
Stayed the same	55.5	57.7	62.9	67.1	67.6	62.4	68.6
Decreased	20.4	22.0	21.4	26.0	26.0	22.0	19.1
Among those whose profits did not increase							
Able to increase profits over time	55.8	25.6	42.0	44.5	27.7	37.8	27.3
Total	274	440	429	389	378	1910	188

Chapter 6

Practices

An understanding of farmers' knowledge and attitudes, as discussed in Chapters 4 and 5 helps investigators know how to influence farmers' behavior. Chapter 6 investigates the actual irrigation and agricultural practices of farmers in this study: their general irrigation practices, crop selections and cultivation practices in six crops – rice, sugar cane, clover, wheat, maize and cotton.

6.1 General Practices

Irrigation Tools and Methods

Table 6.1 presents the distribution of the farmers according to their irrigation practices by region. The majority of farmers (86 percent) use diesel pumps in their irrigation. In East Delta and Middle Egypt a substantial proportion of farmers are able to rely on gravity irrigation at least part of the time. Virtually all farmers used flood irrigation (95 percent), 77 percent used furrow irrigation and 72 percent used both (not shown in table). There was little difference between males and females in tool or method of irrigation. Minor differentials existed by region in the irrigation method used. Furrow irrigation is least common in Upper Egypt, where only 47 percent use the method, compared to almost every farmer in Middle Delta.

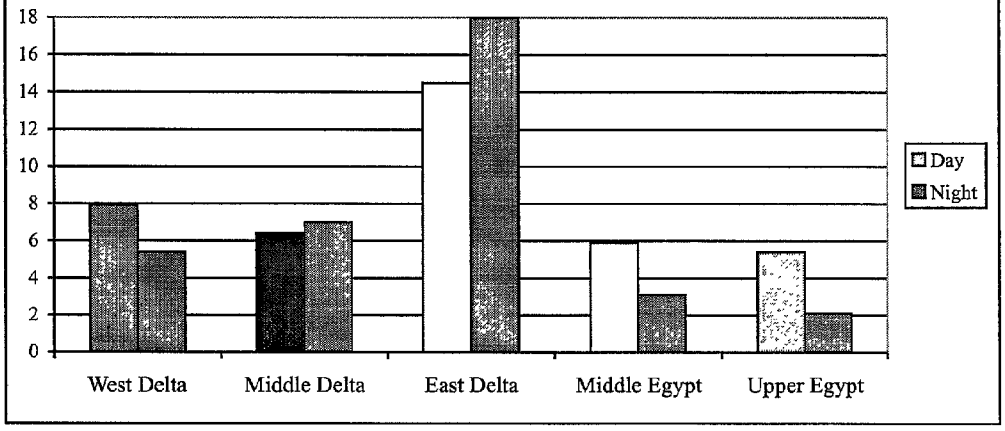
Seasonal Frequency of Irrigation

Table 6.1 also presents the distribution of the total number of times farmers irrigate in winter and in summer. Farmers carried out half of their summer irrigations at night (8 of 16, on average) and about a quarter of their winter irrigations at night (2 of 7, on average). The mean number of irrigations differed by region in every season, with the biggest differences in the summer when East Delta farmers irrigated about 33 times per summer compared to 13 times in other parts of the Delta and 8-9 times in Upper Egypt. One way they coped with their higher need for water was to increase the proportion of times they irrigated at night, which at just over half their irrigations was the highest among the five regions. Farmers in the Middle Delta also performed half of their summer irrigations at night, although their land required only 13 summer irrigations. This irrigation pattern suggests that farmers were already resorting to night irrigation to resolve irrigation problems they encounter.

Table 6.1: Percent distribution of farmers according to their practices in irrigation by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Tool of irrigation (multiple response)							
Sakia	0.0	8.2	18.2	0.0	0.0	6.0	7.4
Tanpor	0.0	0.0	0.2	0.5	0.3	0.2	0.0
Diesel pump	99.6	94.8	71.8	73.5	93.4	85.7	79.8
Electrical pump	0.0	0.0	0.2	0.5	2.1	0.6	0.0
Well pump	5.5	32.0	0.0	15.9	14.0	14.2	14.9
Gravity irrigation	0.0	0.0	20.5	27.5	5.6	11.3	12.8
Method of irrigation (multiple response)							
Flood method	97.4	96.4	96.5	90.5	95.2	95.1	95.2
Furrow method	88.3	97.0	78.6	77.1	47.1	77.7	77.1
Total number of summer irrigations							
0-6	35.4	30.7	11.9	32.6	50.5	31.5	32.4
7-11	27.0	42.3	6.3	51.7	38.9	33.2	26.6
12+	37.6	27.0	81.8	15.7	10.6	35.3	41.0
Mean	13.3	13.4	32.5	9.0	7.5	15.6	18.8
Number of night irrigations in summer							
0	25.9	14.8	9.1	38.8	57.1	28.4	36.7
1-5	41.6	51.6	17.2	47.6	34.4	38.2	29.8
6+	32.5	33.6	73.7	13.6	8.5	33.4	33.5
Mean	5.4	7.0	18.0	3.1	2.1	7.5	9.2
Total number of winter irrigations							
0-4	36.5	22.3	29.1	13.6	21.2	23.9	21.8
5-7	35.0	42.7	28.4	46.8	52.9	41.3	43.1
8+	28.5	35.0	42.4	39.6	25.9	34.9	35.1
Mean	6.5	7.1	8.5	7.8	6.4	7.3	7.0
Number of night irrigations in winter							
0	42.3	38.6	35.9	50.4	66.9	46.5	57.4
1-2	28.1	31.6	22.8	19.5	20.4	24.5	17.0
3+	29.6	29.8	41.3	30.1	12.7	29.0	25.5
Mean	1.9	1.8	2.9	2.0	0.9	1.9	1.4
Proportion who level the land	100.0	98.9	99.1	99.2	96.6	98.7	96.8
Among those who level the land							
Method of used to level land (multiple responses possible)							
By hand	2.9	4.3	6.5	23.1	43.9	16.3	9.6
By cultivator	2.2	4.5	5.6	8.7	6.9	5.8	3.7
By mechanical cultivation	94.9	96.4	95.1	86.1	64.6	87.5	91.0
By laser	1.5	0.5	0.2	9.8	9.5	4.2	0.5
Total	274	440	429	389	378	1910	188

Figure 6.1
Mean Number of Summer Day and Night Irrigations by Region



Land Leveling

Farmers were asked if they leveled the land and, if so, what methods they used. Almost all the farmers level their land, the majority by mechanical cultivators. More than 40 percent of farmers in Upper Egypt leveled their land by hand compared with around 5 percent in Delta regions.

Sources of Irrigation Water and Irrigation from Drains

Farmers were asked about the main source of irrigation water. As Table 6.2 shows, the main sources of irrigation water were the canal or *mesqa* (83 percent) and ground water (18 percent), with no significant difference between male and female farmers. However, the proportions of farmers obtaining their water from the canal or *mesqa* differed significantly among men by region, by position of *mesqa* on the canal, and by location of farm on the *mesqa* (Tables 6.3 and 6.4). By region, farmers in Upper Egypt are most likely to use water from the canal or *mesqa* (84 percent), compared to 49 percent of farmers in the Middle Delta. Farmers at the beginning of the canal or *mesqa* were significantly more likely to take water from those waterways than those at the end of a canal or *mesqa* (see Tables 6.3 and 6.4).

The alternative sources of water are ground water and water from drains. Farmers in Middle Delta rely the most heavily on ground water, and those in the East Delta rely the most heavily on drains. By position on the canal and position on the *mesqa*, those at the end of the waterways are most likely to rely on these two alternative sources.

Farmers were asked if their land was located on a covered or partially covered drain (ie., one from which the farmer could potentially draw water). About 30 percent of both male and female farmers' farms were located next to such drains. There was significant variation among male farmers by region: only a minority of farms in Upper Egypt are located next to these drains (7 percent), compared to just over half of farms in East Delta. Among farms located on drains, about half of farmers irrigate from drains, a percentage which does not vary significantly by region.

Table 6.2: Percent distribution of farmers by source of irrigation water by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Source of irrigation water							
Canal or *mesqa*	74.5	48.6	67.1	68.6	84.1	67.6	66.5
Ground water	14.2	31.6	0.0	15.5	15.1	15.6	14.9
Drain	10.9	18.9	28.9	9.3	2.9	14.9	17.0
Farm located on an uncovered or partially covered drain	16.4	36.4	56.2	20.1	7.4	28.8	30.3
Among farms located on a drain **Farmer irrigates from drain**	66.7	51.9	51.5	46.2	39.3	51.4	56.1
Total	274	440	429	389	378	1910	188

Tables 6.3 and 6.4 show that there is a significant increase in the proportion of farmers who irrigate from drains when the *mesqa* is situated at the end of a canal and when the farm is situated at the end of a *mesqa*.

Table 6.3: Percent distribution of farmers by source of irrigation water and location of *mesqa* on canal, KAP Survey 1998

Variable & Category	Male		
	Mesqa Location		Total
	At the Beginning	At the End	
Source of irrigation water			
Canal or *mesqa*	77.6	55.3	67.6
Ground water	11.8	20.0	15.6
Drain	9.4	21.6	14.9
Farm located on an uncovered or partially covered drain	23.1	36.0	28.8
Among farms located on a drain **Farmer irrigates from drain**	40.7	60.1	51.4
Total	1054	856	1910

Table 6.4: Percent distribution of farmers by source of irrigation water by location of land on *mesqa*, KAP Survey 1998

Variable & Category	Male			
	Land location on the *mesqa*			Total
	At the Beginning	At the Middle	At the End	
Source of irrigation water				
Canal or *mesqa*	72.7	65.4	64.4	67.6
Ground water	13.7	15.3	17.6	15.6
Drain	11.8	16.4	16.6	14.9
Farm located on an uncovered or partially covered drain	27.2	30.2	29.4	28.9
Among farms located on a drain **Farmer irrigates from drain**	43.6	54.3	56.3	51.4
Total	659	659	592	1910

6.2 Determinants of Crops Selection

Table 6.5 shows the distribution of farmers by reason for crop selection, region and sex. Almost all farmers mentioned household usage as the main factor affecting crop selection followed in descending order by quantity of water available, market price, neighbor's cultivation, feeding livestock, soil suitability and crop rotation. Female farmers reported the same pattern of reasons.

Table 6.5: Percent distribution of farmers by reason for crop selection by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Reason for crop selection (multiple responses possible)							
Household usage	26.3	51.1	47.1	55.0	50.0	47.2	50.0
Quantity of water	51.1	41.4	43.6	23.7	14.3	34.3	30.9
Market price	10.6	24.5	25.4	39.3	29.9	26.8	20.7
According to neighbor's cultivation	5.5	4.1	20.7	36.0	35.2	20.3	21.3
Feeding livestock	5.1	40.0	12.1	22.9	15.1	20.3	18.6
Suits the soil	25.9	14.1	33.4	4.9	9.8	17.4	18.1
Crops rotation	20.1	14.3	21.9	7.5	7.5	13.6	18.1
Level of effort	6.2	14.3	1.9	5.9	6.9	7.2	5.3
Cost of agriculture inputs	5.8	3.6	1.4	4.4	4.0	3.7	0.5
According to area of land	1.8	0.7	1.4	1.5	3.2	1.7	2.1
Availability of agriculture factors	1.1	1.6	1.2	2.3	1.6	1.6	1.6
Familiarity with crop	0.0	0.2	0.0	1.0	0.0	0.3	0.0
Others	1.1	0.9	0.7	0.8	0.8	0.8	0.5
Don't know	0.0	0.0	0.0	0.3	0.0	0.1	0.0
Total	274	440	429	389	378	1910	188

There are regional differentials in the factors that affect crop selection. Quantity of water ranks first in West Delta (51 percent) followed by household usage and soil condition (26 percent each). Market price ranks fifth (11 percent only). On the other hand, household usage ranked first in the other regions. Quantity of water ranked second in Middle and East Delta, while market price ranked second in Middle Egypt and neighbor's cultivation ranked second in Upper Egypt.

Table 6.6 shows the same information by education level. There is no significant variation in the order of reasons for selecting crops by education level, except for market price. Educated farmers were more likely to take market prices into consideration when choosing which crops to cultivate.

Table 6.6: Percent distribution of farmers by reason for crop selection by education, KAP Survey 1998.

Variable & Category	Male				Total
	Education				
	No Education	Primary	Prep.	Sec. Or Higher	
Reasons of selecting crops					
Suits the soil	17.6	16.4	16.7	18.3	17.4
Market price	25.3	26.5	23.8	32.5	26.8
Quantity of water	34.4	34.1	36.9	33.6	34.3
Cost of agriculture inputs	2.2	4.6	7.1	5.8	3.7
Availability of agriculture inputs	1.1	1.5	2.4	2.9	1.6
Crop rotation	15.5	12.0	10.7	10.7	13.6
Household usage	49.1	47.6	51.2	40.6	47.2
Level of effort	4.2	11.4	7.1	10.1	7.2
According to neighbor's cultivation	20.9	18.9	20.2	22.3	20.7
According to area of land	1.7	1.5	0.0	2.3	1.7
Feeding livestock	19.9	22.7	26.2	16.8	20.3
Familiarity with crop	0.4	0.0	0.0	0.3	0.3
Other	0.7	0.8	0.0	1.4	0.8
Don't know	0.0	0.2	0.0	0.0	0.1
Total	1007	475	84	345	1910

6.3 Crop Cultivation Pattern

Table 6.7 presents the crop pattern of the farmers in the last two seasons (summer 1997 and winter 1998). The majority of farmers in Delta regions cultivated rice and maize in the summer and wheat and clover in winter, while a majority of farmers in Middle Egypt and Upper Egypt cultivated maize in the summer and wheat and clover in winter. Around one-fifth of farmers cultivated cotton in summer and less than one-fifth of farmers in Upper Egypt cultivated sugar cane in winter. The crop pattern for female farmers was almost the same as that of male farmers.

By region, rice was more likely to be cultivated in East Delta followed by West Delta then Middle Delta. Maize was cultivated in all the regions, although East Delta had the smallest percentage of farmers who cultivated maize. Cotton was also cultivated in all regions but more in Delta regions than Middle and Upper Egypt.

In winter, wheat was cultivated in all regions by almost the same percentage of farmers. Sugar cane was cultivated mainly in Upper Egypt and on a few farms in West Delta. Clover was cultivated in all regions, with the highest proportion in Middle Delta.

Table 6.7: Percent distribution of farmers by crops grown in summer 1997 and winter 1997-98 by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Summer Crops							
Rice	36.5	28.2	79.5	3.1	0.0	30.2	37.8
Maize	47.1	57.3	13.3	63.8	55.0	46.8	39.9
Sugar cane	0.7	0.0	0.0	0.0	18.0	3.7	1.6
Cotton	25.2	19.3	28.2	12.9	13.2	19.6	14.9
Winter Crops							
Wheat	47.1	44.1	47.3	42.9	37.0	43.6	41.5
Fava Beans	7.7	5.5	9.6	5.9	11.4	8.0	6.4
Potato	5.5	5.5	0.2	6.4	0.0	3.4	1.6
Sugar cane	1.1	0.0	0.0	0.0	17.7	3.7	1.6
Clover	61.7	74.5	69.5	46.0	39.4	58.8	64.4
Total	274	440	429	389	378	1910	188

6.4 Rice Cultivation

Crop cultivation is one of the main issues that was investigated in the survey since it affects the amount of water used for irrigation. Farmers were asked about the crops they cultivated in the two seasons preceding the survey (i.e., summer 1997 and winter 1997-98). For each crop cultivated, the farmer was asked the reason for crop selection, the number of times and how he irrigated that crop, the cost of irrigating the crop and the amount produced per feddan.

Table 6.8 presents farmers' practices in rice cultivation. Rice is not cultivated in Upper Egypt. Nationally, the mean area under rice cultivation per farmer is 1.5 feddans, with a high of 2.5 feddans in Middle Delta. Around 70 percent of the fields were less than 2 feddan, and only in 2 percent of the cases was the area 6 feddans or more. Almost every farmer consumes some of the rice he grows in the home, while 57 percent of farmers also grow rice to sell.

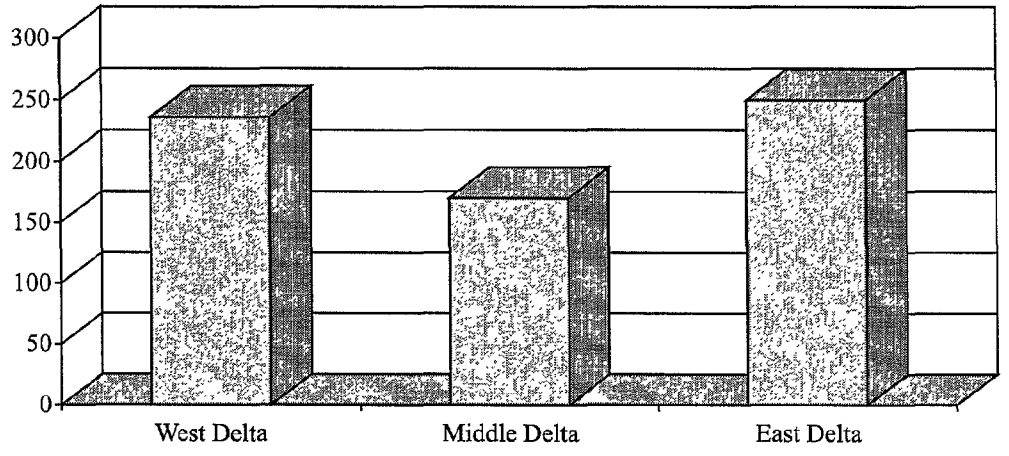
Nationally, rice is irrigated 32 times during cultivation. However, there is substantial variation between regions, ranging from 37 times in East Delta to 20 times in West Delta. Around 60 percent of the farmers irrigated the rice more than 20 times. The majority of farmers (male and female) irrigated rice using the flood method (99 percent) and by diesel pump (78 percent).

Table 6.8: Percent distribution of farmers according to their practices in rice cultivation by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Area (feddan)							
< 2	85.0	29.8	79.8	75.0	0.0	69.8	83.1
2 -	10.0	56.5	15.2	16.7	0.0	23.8	15.5
4 -	1.0	8.9	2.9	0.0	0.0	3.8	1.4
6 +	4.0	4.8	1.2	8.3	0.0	2.1	0.0
Mean	1.4	2.5	1.2	1.3	0.0	1.5	1.0
Reason for cultivating							
For market	61.9	71.0	52.0	68.1	0.0	57.3	45.5
For house	100.0	98.3	95.6	100.0	0.0	97.3	97.1
Mean number of times irrigated	20.1	25.6	37.4	41.0	0.0	32.0	35.0
Tool of irrigation							
Sakia	2.0	0.0	18.2	0.0	0.0	11.1	16.9
Tanpor	0.0	0.0	1.5	0.0	0.0	0.9	4.2
Diesel	97.0	100.0	62.8	100.0	0.0	77.5	71.8
Electrical pump	0.0	0.0	0.3	0.0	0.0	0.2	0.0
Well pump	1.0	0.0	0.3	0.0	0.0	0.3	0.0
Gravity	0.0	0.0	16.7	0.0	0.0	9.9	7.0
Method of irrigation							
Flood method	98.0	99.2	99.4	100.0	0.0	99.1	98.6
Furrow method	2.0	0.0	0.3	0.0	0.0	0.5	1.4
Cost of irrigation per feddan							
< 100	18.0	50.0	34.3	16.7	0.0	34.5	23.2
100 -	74.0	46.0	52.2	58.3	0.0	54.7	63.8
500 +	8.0	4.0	13.2	25.0	0.0	10.5	13.0
Mean (LE)	235.85	169.95	249.67	347.62	0.00	232.64	239.04
Mean production per feddan (tonne)	374	556	347	380	0	397	389
Short duration rice variety grown (Giza 177 or Giza 178)	19.0	76.6	18.5	16.7	0.0	31.0	28.2
Total	100	124	341	12	00	577	71

The mean cost of rice irrigation was LE 232.64 per feddan, with significant variation by region. The cost was higher in East Delta (LE 249.67), followed by West Delta (LE 235.85) then Middle Delta (LE 169.95). Figure 6.2 presents the cost of irrigating rice per feddan in Delta regions.

Figure 6.2
Mean Cost of Irrigation of Rice per Feddan
in Delta Regions (LE)



On average, a feddan of rice produces about 400 tonnes. The difference in mean by region is not statistically significant. In the summer of 1997, just under a third of farmers grew a short duration variety of rice, with adoption of these varieties significantly higher in the Middle Delta.

Message: There are advantages to growing short duration varieties of rice.

6.5 Sugar Cane Cultivation

Sugar cane was cultivated mainly in Upper Egypt and a little in West Delta (5 farmers in the sample). Only 6 female farmers (out of 188) cultivated sugar cane. Table 6.9 presents the findings concerning farmers' practices in cultivating sugar cane in Upper Egypt. More than 90 percent of fields planted in sugar cane were less than 2 feddan. The mean area planted in sugar cane was less than one feddan (0.6 feddan) in Upper Egypt. The purpose of cultivating sugar cane was mainly for market, which was mentioned by more than 90 percent of farmers. The mean number of irrigation was 9 times and the mean cost of irrigation is LE 158 per feddan.

Table 6.9: Percent distribution of farmers according to their practices in sugar cane cultivation by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Area (feddans)							
< 2	100.0	0.0	0.0	0.0	94.1	94.3	100.0
2 +	0.0	0.0	0.0	0.0	5.9 0.65	5.7	0.0
Mean	0.32	0.0	0.0	0.0		0.64	0.23
Reason for cultivating							
For market	98.6	0.0	0.0	0.0	91.0	91.4	100.0
For house use	0.0	0.0	0.0	0.0	19.6	19.1	0.0
Mean number of times irrigated	8.80	0.0	0.0	0.0	9.32	9.00	8.00
Tool of irrigation							
Sakia	0.0	0.0	0.0	0.0	0.7	0.7	0.0
Tanpor	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diesel	100	0.0	0.0	0.0	79.3	80	100
Well Pump	0.0	0.0 0.0	0.0 0.0	0.0 0.0	1.5 18.5	1.4	0.0
Gravity	0.0					17.9	0.0
Method of irrigation							
Flood method	60.0	0.0	0.0	0.0	89.6	88.6	33.3
Furrow method	40.0	0.0	0.0	0.0	10.4	11.4	66.7
Cost of irrigation per feddan							
< 100	0.0	0.0	0.0	0.0	41.5	40.0	0.0
100 -	100.0	0.0	0.0	0.0	55.6	57.1	83.3
500 +	0.0	0.0	0.0	0.0	3.0	2.9	16.7
Mean	275.20	0.0	0.0	0.0	158.44	162.43	166.00
Total	5	00	00	00	135	140	6

Sugar cane was irrigated using diesel pumps in more than three-fourths of the farms in Upper Egypt. Flood method was used by the majority of farmers (89 percent). In West Delta the flood method was used by 60 percent of the farmers and the furrow method was used by the other 40 percent.

Farmers who had ever cultivated sugar cane were asked why they chose to cultivate it. The majority of the farmers chose sugar cane because of high income and suitability of land (among other reasons) (not showed in the table). The main reasons for not cultivating sugar cane were the unsuitability of land, shortage of water and lack of knowledge how to cultivate it (see Table 6.10).

Table 6.10: Percent distribution of farmers by reason for cultivating or not cultivating sugar cane by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Reasons for cultivating sugar cane							
High income	6.2	0.0	0.5	1.0	15.9	4.3	1.1
Takes less effort	1.5	0.2	0.5	0.0	3.4	1.0	0.5
Certain crop yield	1.1	0.0	0.2	0.3	1.1	0.5	0.5
Certainity of markeeting	1.5	0.0	0.0	0.0	6.6	1.5	0.0
Suitable for land	0.0	0.0	0.0	0.0	2.9	0.6	0.5
Neighbors cultivate it	0.0	0.0	0.0	0.5	12.4	2.6	2.1
Other	0.7	0.7	0.0	0.6	12.4	2.9	1.0
Reasons for not cultivating sugar cane							
It takes along time	1.8	2.3	2.3	1.3	1.3	1.8	0.5
For bidden to cultivate it	13.1	12.7	6.1	5.4	10.1	9.3	2.1
Deficiency of water	12.8	22.5	20.5	59.6	16.7	27.1	22.3
Land is unsuitable	35.0	39.1	75.3	16.7	5.8	35.5	32.4
Less income	1.1	1.8	0.5	0.3	1.1	0.9	0.5
Small land	15.3	31.8	9.1	15.4	17.5	18.2	23.4
Don't know how to cultivate it	25.9	7.0	18.2	9.8	13.5	14.1	31.4
Other	7.3	5.5	1.6	25.4	29.9	13.8	12.2
Total	274	440	429	389	378	1910	188

6.6 Cotton Cultivation

Cotton is cultivated in all regions in Egypt. Around one-fifth of the male farmers and 16 percent of female farmers cultivated cotton in the year preceding the survey. Table 6.11 shows that three-fourths of the fields planted to cotton were less than 2 feddans. Overall, the mean area planted to cotton was around 1.5 feddan. The mean area was higher in Middle Delta (2.1 feddan), followed by East Delta (1.5 feddan), Middle Egypt (1.2 feddan), West Delta (1.2 feddan), and Upper Egypt (1 feddan). The farmers cultivated cotton for market in more than 90 percent of cases. The mean number of irrigations was 7 times and the mean cost of irrigation was LE 125.26 per feddan. The cost of irrigating cotton was higher in Middle Egypt and Upper Egypt than other regions. Female farmers' mean number of irrigations was 9 times; therefore their mean cost were more (LE 163.35).

Table 6.11: **Percent distribution of farmers according to their practices in cotton cultivation by region and sex, KAP Survey 1998.**

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Area (feddans)							
< 2	88.4	45.5	75.2	92.2	96.1	75.8	83.3
2 -	8.7	45.5	19.8	3.9	0.0	18.9	13.3
4 +	2.9	9.1	5.0	3.9	3.9	5.2	3.3
Mean	1.17	2.08	1.51	1.19	0.97	1.46	0.87
Reason for cultivating							
For market	97.3	96.5	98.2	99.9	96.4	97.5	93.4
For house	2.8	1.0	1.0	2.3	3.7	2.0	0.0
Mean number of times irrigated	6.75	6.38	8.03	7.98	7.85	7.00	9.00
Tool of irrigation							
Sakia	0.0	4.5	8.3	0.0	0.0	3.7	3.3
Tanpor	0.0	0.0	0.0	2.0	0.0	0.3	0.0
Diesel	98.6	87.5	90.1	60.8	96.1	87.9	83.3
Electrical pump	0.0	0.0	0.8	0.0	0.0	0.3	0.0
Well pump	1.4	8.0	0.0	7.8	2.0	3.4	3.3
Gravity	0.0	0.0	0.8	29.4	2.0	4.5	10.0
Method of irrigation							
Flood method	1.4	5.7	9.9	15.7	29.4	10.8	13.3
Furrow method	98.6	94.3	90.1	84.3	70.6	89.2	86.7
Cost of irrigation per feddan							
< 100	55.1	68.2	62.0	43.1	23.5	54.5	46.7
100 -	43.5	29.5	35.5	51.0	74.5	42.9	50.0
500 +	1.4	1.1	1.7	5.9	2.0	2.1	3.3
Mean	109.89	110.22	121.76	160.93	141.77	125.26	163.00
Total	69	88	121	51	51	380	30

Cotton was irrigated using diesel pumps on the majority of farms (87 percent). The furrow method of irrigation was used in around 90 percent of farms. This method was used in Delta regions in more than 90 percent of farms. The furrow method was used in Middle Egypt in 85 percent of the cotton farms and in 70 percent of Upper Egypt cotton farms.

6.7 Wheat Cultivation

Wheat is cultivated in all regions in Egypt. Around 40 percent of the farmers (male and female) cultivated wheat in the last year. Table 6.12 presents practices of farmers who cultivated wheat. More than 88 percent of the fields planted to wheat were less than 2 feddans. The mean area was one feddan in all Egypt. The farmers cultivated wheat mainly for household use (94 percent) and in some cases for market (39 percent).

The mean number of wheat irrigations was 5 times and the mean cost of irrigation was LE 114 per feddan. The cost of irrigating wheat was higher in Upper Egypt than other regions. No differences between male and female farmers were found in cultivating wheat.

Wheat was irrigated using diesel pumps in the majority of farms (77 percent). The flood method of irrigation was used in more than 90 percent of farms.

Table 6.12: Percent distribution of farmers according to their practices in wheat cultivation by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Area (feddans)							
<2	88.6	86.7	81.3	92.5	95.9	88.4	93.7
2 -	8.3	12.3	15.8	3.5	2.8	9.1	6.3
4 +	3.1	1.0	3.0	4.1	1.4	2.5	0.0
Mean	1.14	.81	1.17	1.03	.57	.95	.57
Reason for cultivating							
For market	48.5	34.4	47.3	50.9	11.7	39.2	27.8
For house	96.2	96.4	93.6	87.3	98.6	94.2	96.2
For livestock	2.3	27.7	4.4	1.2	2.8	8.5	2.5
Mean number of times irrigated	4.27	4.87	4.70	6.08	5.24	5.04	4.95
Tool of irrigation							
Sakia	0.8	4.6	18.2	0.0	0.0	5.5	8.9
Tanpor	0.0	0.5	0.0	0.6	0.0	0.2	0.0
Diesel	98.5	77.4	66.5	59.0	93.8	77.1	70.9
Electrical pump	0.0	0.0	0.5	0.0	0.0	0.1	0.0
Well pump	0.8	17.4	0.5	3.5	6.2	6.0	6.3
Gravity	0.0	0.0	13.8	37.0	0.0	10.9	13.9
Method of irrigation							
Flood method	99.2	79.5	96.1	86.7	95.9	90.8	92.4
Furrow method	0.8	20.0	3.4	12.1	4.1	8.7	7.6
Cost of irrigation per feddan							
< 100	73.5	70.8	80.8	56.1	47.6	66.6	58.2
100 -	25.8	28.7	17.2	41.0	49.7	31.6	38.0
500 +	0.8	0.5	2.0	2.9	2.8	1.8	3.8
Mean	136.75	85.75	84.95	108.97	176.78	113.80	157.55
Total	132	195	203	173	145	848	79

6.8 Maize Cultivation

Maize is cultivated in all regions in Egypt. Around 47 percent of the farmers (male and female) have cultivated maize in the last year. Table 6.13 presents the practices of those farmers in cultivating maize. More than 90 percent of the fields planted to maize were less than 2 feddans. The mean average area was around three-quarters of a feddan in all Egypt. Farmers cultivated maize mainly for household use (87 percent) and in some cases for market (30 percent).

The mean number of maize irrigations was 7 times and the mean cost of irrigation was LE 167 per feddan. The cost of irrigating maize was higher in Middle Egypt and Upper Egypt than other regions. No differences between male and female farmers were found in the practices toward maize cultivation.

Maize is irrigated using diesel pumps in the majority of farms (77 percent). The furrow method of irrigation is used in more than 90 percent of farms.

Table 6.13: Percent distribution of farmers according to their practices in maize cultivation by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Area (feddans)							
< 2	86.2	95.6	86.2	93.2	97.2	93.3	98.7
2 -	7.7	4.0	12.1	5.2	1.9	4.9	1.3
4 +	6.1	0.4	1.7	1.6	1.0	1.8	0.0
Mean	1.22	0.70	0.93	0.79	0.59	0.79	0.50
Reason for cultivating							
For market	38.5	19.8	46.6	45.6	17.5	30.9	28.9
For house	94.6	98.4	75.9	83.2	79.1	87.7	84.2
For livestock	23.8	59.9	31.0	10.8	25.6	31.2	26.3
Mean number of times irrigated	6.95	7.62	8.33	7.77	6.50	7.35	6.87
Tool of irrigation							
Sakia	0.0	7.5	17.2	0.0	0.0	3.2	6.6
Tanpor	0.0	0.4	0.0	0.8	0.0	0.3	1.3
Diesel	99.2	67.5	67.2	66.8	87.7	76.6	65.8
Electrical pump	0.0	0.0	1.7	0.0	0.9	0.3	0.0
Well pump	0.8	24.6	0.0	.5.6	9.5	11.8	14.5
Gravity	0.0	0.0	13.8	26.4	1.9	8.6	11.8
Method of irrigation							
Flood method	6.9	2.8	8.6	31.6	54.5	23.9	11.8
Furrow method	93.1	97.2	91.4	66.4	45.0	75.5	88.2
Cost of irrigation per feddan							
< 100	45.4	50.0	58.6	43.2	35.1	44.5	34.2
100 -	51.5	47.6	37.9	52.4	61.6	52.2	60.5
500 +	3.1	2.4	3.4	4.4	3.3	3.3	5.3
Mean	136.63	135.7	116.79	203.67	193.28	166.96	176.99
Total	130	252	58	250	211	901	76

6.9 Clover Cultivation

Clover is cultivated in all regions in Egypt. Around 60 percent of the farmers (male and female) cultivated clover in the last year. Table 6.14 presents the practices of those farmers in cultivating clover. More than 80 percent of the fields planted to clover were less than 2 feddans. The mean average area was one feddan throughout Egypt. The mean area was higher in Middle Delta (1.32) followed by East Delta, West Delta, Middle Egypt and then Upper Egypt. Farmers cultivated clover mainly for livestock and in some cases for market.

Table 6.14: Percent distribution of farmers according to their practices in clover cultivation by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Area(feddan)							
< 2	91.1	72.3	79.2	96.2	98.0	84.2	90.9
2 -	7.7	22.3	15.4	2.7	2.0	12.4	8.8
4 +	1.2	5.5	5.4	1.0	0.0	3.3	0.8
Mean	0.88	1.32	1.22	0.67	0.40	1.00	0.69
Reason for cultivating							
For market	15.4	42.7	47.7	41.3	14.1	35.9	47.1
For livestock	95.8	90.8	83.9	90.2	90.7	89.7	75.2
Mean number of times irrigated	6.75	6.38	8.03	7.98	7.85	7.00	7.00
Tool of irrigation							
Sakia	0.0	5.2	14.4	0.0	0.7	5.4	8.3
Tampor	0.0	0.0	1.7	0.5	0.0	0.5	2.5
Diesel	99.4	79.0	69.1	73.1	88.0	79.7	71.9
Electrical pump	0.0	0.0	0.3	0.0	1.3	0.3	0.0
Well pump	0.6	15.9	0.3	3.8	7.3	6.4	7.4
Gravity	0.0	0.0	13.8	22.0	2.7	7.6	9.9
Method of irrigation							
Flood method	98.8	98.2	98.7	94.0	99.3	97.9	97.5
Furrow method	1.2	1.8	1.0	4.4	0.0	1.7	2.5
Cost of irrigation per feddan							
< 100	55.0	64.9	72.8	42.9	27.3	57.0	58.7
100 -	44.4	32.6	24.2	55.5	66.0	40.3	38.8
500 +	0.6	2.1	2.3	1.6	6.7	2.5	1.7
Mean	114.98	120.54	97.14	139.50	335.68	143.64	143.80
Total	169	328	298	182	150	1127	121

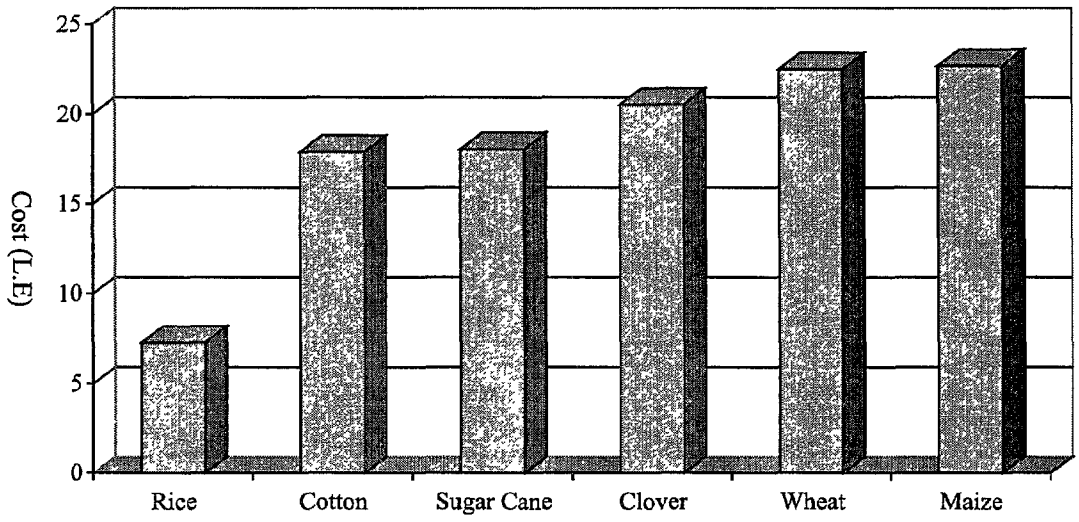
The mean number of clover irrigations was 7 times and the mean cost of irrigation was LE 143.64 per feddan. The cost of irrigating clover was higher in Upper Egypt and Middle Egypt than other regions. No differences between male and female farmers were found in clover cultivation practices.

Clover was irrigated using diesel pumps in the majority of farms (80 percent). The flood method of irrigation is used in more than 90 percent of farms.

6.10 Differentials in Irrigation Cost

It is clear from the previous sections of this chapter that differentials among the 6 main crops exist in the number of irrigations and the cost of irrigation. The cost per feddan per time can be calculated by dividing the mean cost per feddan by the mean number of irrigations for each crop. Figure 6.3 illustrates the differentials among the 6 crops in the mean cost of irrigation per feddan per time. Although rice has the maximum number of irrigations, the mean cost of irrigating a feddan of rice is less than any other crop. This indicates that for each irrigation, a feddan of rice takes less water than other crops. Sugar cane, cotton and clover have similar averages of cost per feddan per irrigation. Wheat and maize cost more than other crops to irrigate.

Figure 6.3
Mean cost per Irrigation per feddan by crop



Chapter 7

Irrigation Problems

The irrigation problems that farmers face are investigated in Chapter 7. These challenges included seasonal problems with water quantity, problems with water flow, problems with water quality, and consequences of irrigation and drainage problems. Differentials between regions, location of *mesqa* on the canal (beginning or end), and location of the farmers' land on the *mesqa* (beginning, middle or end) will be presented throughout the discussion. The analysis by location is presented for male farmers only due to the small number of female farmers interviewed.

7.1 Seasonal Problems with Water Quantity

Table 7.1 takes a region by region look at seasonal irrigation problems: the level of water in *mesqa*s in winter and summer, irrigation problems in summer and winter, and seasonal likelihood of water reaching the end of a *mesqa*.

Around two-thirds of male and female farmers reported that there was not enough water in the *mesqa* in the summer, ranging from 40 percent in Upper Egypt to 77 percent in the Middle Delta. Fifty-five percent of farmers said that there was enough water in the *mesqa* in winter, while only 15 percent mentioned that water in the *mesqa* was enough in summer.

Around 40 percent of farmers mentioned shortage of water as the main irrigation problem in winter and that percentage doubled to 81 percent in the summer. Irregular shifts were the second largest problem in winter (10 percent) as well as in summer (13 percent). Other reasons mentioned by a minority of farmers were high cost of irrigation, water salinity and crowded pumps.

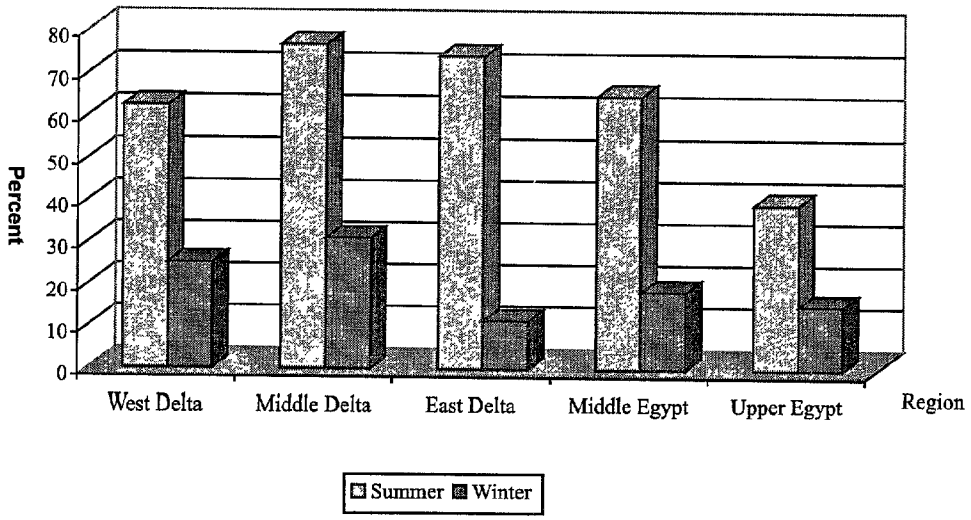
Table 7.1: Percent distribution of farmers according to seasonal problems with water quantity by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Water in *mesqa* for irrigation in winter							
Enough	49.3	47.5	59.7	54.0	60.8	54.5	53.2
Was sometimes enough	25.5	21.4	28.7	27.5	24.1	25.4	28.2
Was not enough	25.2	31.1	11.4	18.5	15.1	20.1	18.6
Water in *mesqa* for irrigation in summer							
Enough	14.2	7.3	3.3	17.2	33.1	14.5	11.7
Was sometimes enough	22.6	15.9	22.6	18.0	26.5	20.9	19.1
Was not enough	62.4	76.8	74.1	64.8	39.9	64.4	68.6
Irrigation problems in winter							
Shortage of water	45.3	46.4	34.3	41.6	34.1	40.1	41.5
Irregular shifts	4.4	19.1	12.1	1.0	10.8	10.1	9.6
High cost of irrigation	0.0	4.3	0.2	0.0	2.4	1.5	1.1
Saltiness of water	0.0	3.2	1.6	1.3	0.0	1.4	2.7
Water is cold	0.0	0.7	0.0	0.0	0.0	0.2	0.0
Pumps are crowded	0.0	0.2	0.2	0.3	0.0	0.2	2.1
No problem	51.8	40.5	53.1	57.3	60.1	52.3	50.5
Other	1.1	2.7	0.9	0.3	0.5	1.2	0.5
Irrigation problems in summer							
Shortage of water	81.4	88.4	92.5	77.1	60.8	80.6	84.6
Irregular shifts	6.9	27.3	8.9	2.6	13.5	12.5	9.1
High cost of irrigation	0.0	4.5	1.4	0.8	2.4	2.0	1.1
Saltiness of water	0.0	8.6	4.4	3.1	0.0	3.6	3.7
Pumps are crowded	0.4	0.2	1.2	0.3	0.0	0.4	3.2
No problem	17.2	7.5	3.7	22.4	35.2	16.5	13.3
Other	1.1	2.0	0.7	0.3	0.8	1.0	1.1
Water reaches the end of *mesqa* in winter							
Always	33.6	34.3	41.5	35.7	56.6	40.5	37.8
Often	22.6	16.6	34.7	36.5	19.6	26.2	34.6
Sometimes	43.8	48.6	23.5	27.8	23.8	33.1	27.7
Water reaches the end of *mesqa* in summer							
Always	9.9	5.7	5.6	15.2	33.6	13.7	9.0
Often	13.1	5.9	12.6	10.8	10.6	10.4	12.2
Sometims	76.3	88.2	81.8	74.0	55.3	75.7	78.2
Total	274	440	429	389	378	1910	188

Farmers were asked if the water reached the end of *mesqa*s in winter and summer. Forty-one percent reported that water always reached the end of the *mesqa* in winter, compared with 14 percent in summer. One-third of farmers mentioned that water sometimes reached the end of *mesqa*s in winter, compared to 76 percent in summer. The responses of female farmers were substantially the same.

Figure 7.1

Proportion of farmers who say they do not have adequate wate



Irrigation problems differ dramatically between the beginning and the end of any canal system; thus, for our survey, half of the *mesqas* were selected at the beginning of a distributor canal and the other half at the end of a distributor canal. Tables 7.2 and 7.3 discuss responses to the same questions posed in Table 7.1 but are presented by the position of the *mesqa* on the canal (beginning or end) and location of the farmers' land on the *mesqa* (beginning, middle or end).

Table 7.2 shows that 16 percent of farmers whose *mesqa* was at the beginning of a canal reported that there was enough water for irrigation in winter, compared with 25 percent of farmers whose *mesqa* was at the end of a canal. Problems were worse in the summer: 57 percent of farmers at the beginning of a canal said they did not have enough water, compared to 74 percent of those at the end of a canal. Differences by *mesqa* position are significant.

Finally, these differences are reflected in the proportion of farmers who say that the water reaches the end of the mesqa. In the summer, 19 percent of farmers at the beginning of a canal say it always reaches the end, compared to 7 percent of farmers at the end of the canal. Even in winter, only 46 percent of those at the beginning of a canal say that the water always reaches the end of the *mesqa*, dropping to 34 percent among those at the end of a canal.

Table 7.2: Percent distribution of farmers according to seasonal problems with water quantity by position of *mesqa* on canal, KAP Survey 1998.

Variable & Category	*Mesqa* position		Total
	At the Beginning	At the End	
Water in *mesqa* for irrigation in winter			
Enough	59.1	48.7	54.5
Was sometimes enough	24.5	26.5	25.4
Was not enough	16.4	24.6	20.1
Water in *mesqa* for irrigation in summer			
Enough	19.2	8.8	14.5
Was sometimes enough	24.3	16.7	20.9
Was not enough	56.5	74.2	64.4
Irrigation problems in winter			
Shortage of water	34.9	46.5	40.1
Irregular shifts	9.5	10.9	10.1
High cost of irrigation	1.0	2.1	1.5
Saltiness of water	0.3	2.7	1.4
Water is cold	0.1	0.2	0.2
Pumps are crowded	0.3	0.0	0.2
No problem	57.9	45.3	52.3
Other	1.2	1.1	1.2
Irrigation problems in summer			
Shortage of water	74.1	88.6	80.6
Irregular shifts	10.7	14.6	12.5
High cost of irrigation	1.8	2.2	2.0
Saltiness of water	1.2	6.5	3.6
Pumps are crowded	0.3	0.6	0.4
No problem	22.5	9.2	16.5
Other	0.8	1.3	1.0
Water reaches the end of *mesqa* in winter			
Always	45.9	33.9	40.5
Often	24.9	27.8	26.2
Sometimes	28.9	38.3	33.1
Water reaches the end of *mesqa* in summer			
Always	19.4	6.7	13.7
Often	11.4	9.1	10.4
Sometimes	69.0	83.9	75.7
Total	1054	856	1910

Table 7.3 presents the same problems by location of the land on the *mesqa* (beginning, middle or end). Interestingly, differences in water quantity by location of the land on the *mesqa* were not significant.

Table 7.3: Percent distribution of farmers according to seasonal problems with water quantity by position of land on *mesqa*, KAP Survey 1998.

Variables & Category	Male			Total
	Land position on the *mesqa*			
	At the Beginning	At the Middle	At the End	
Water in *mesqa* for irrigation in winter				
Enough	46.4	54.3	52.4	54.5
Was sometimes enough	24.6	27.3	24.2	25.4
Was not enough	19.0	18.2	23.5	20.1
Water in *mesqa* for irrigation in summer				
Enough	14.9	14.4	14.2	14.5
Was sometimes enough	23.1	20.3	20.3	20.9
Was not enough	61.9	65.1	66.4	64.4
Irrigation problems in winter				
Shortage of water	38.8	39.6	42.1	40.1
Irregular shifts	8.8	10.3	11.3	10.1
High cost of irrigation	0.6	1.4	2.7	1.5
Saltiness of water	1.1	1.7	1.4	1.4
Water is cold	0.2	0.3	0.0	0.2
Pumps are crowded	0.3	0.2	0.0	0.2
No problem	54.8	52.5	49.2	52.3
Other	0.6	1.4	1.5	1.2
Irrigation problems in summer				
Shortage of water	81.0	80.7	79.9	80.6
Irregular shifts	10.8	14.1	12.5	12.5
High cost of irrigation	1.2	1.5	3.4	2.0
Saltiness of water	3.3	3.8	3.7	3.6
Pumps are crowded	0.5	0.5	0.3	0.4
No problem	16.4	16.2	17.1	16.5
Other	0.5	0.8	1.9	1.0
Water reaches the end of *mesqa* in winter				
Always	41.4	40.4	39.7	40.5
Often	26.9	26.1	25.5	26.2
Sometimes	31.6	33.4	34.6	33.1
Water reaches the end of *mesqa* in summer				
Always	13.4	13.7	14.2	13.7
Often	12.0	8.5	10.6	10.4
Sometimes	74.5	77.7	74.7	75.7
Total	659	659	592	1910

7.2 Problems with Water Flow

Farmers were also asked about blockages of the waterways. As Table 7.4 shows, around 53 percent of farmers reported that *mesqa*s were never or rarely blocked by wastes, and 47 percent said that they were at least sometimes blocked. A small proportion, 9 percent, said their mesqas were always blocked. There were significant variations by region. In the West Delta, 63 percent of farmers reported that *mesqa*s were at least sometimes blocked, including 22 percent who said they were always blocked. Blockages are at a minimum in the East Delta, where only 32 percent of farmers said that their *mesqa*s were sometimes, often, or usually blocked.

Table 7.4: Percent distribution of farmers reporting obstruction of *mesqa*, canals and drains by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
***Is mesqa* blocked by waste**							
No	23.4	33.0	63.6	51.2	59.0	47.3	45.7
Rarely	13.5	7.7	4.4	3.6	4.0	6.2	4.8
Sometimes	30.3	31.6	20.3	31.4	24.6	27.4	27.1
Often	10.6	16.6	7.7	8.0	5.8	9.8	14.9
Usually	22.3	11.1	4.0	5.7	6.6	9.1	6.9
Is canal blocked by waste							
No	41.2	63.2	71.6	45.0	38.6	53.4	56.4
Rarely	15.3	8.6	11.2	7.2	3.4	8.8	9.0
Sometimes	30.3	18.9	11.9	32.9	40.2	26.0	22.3
Often	7.3	4.1	2.8	9.8	10.6	6.7	8.0
Usually	5.8	5.2	2.6	5.1	7.1	5.1	3.7
Total	274	440	429	389	378	1910	188
Among farms in an area with an open or partially open drainage system							
Is drain blocked by waste							
No	40.9	54.9	72.1	46.8	29.2	54.5	60.6
Rarely	19.3	17.8	9.0	9.3	6.2	12.5	11.8
Sometimes	30.7	16.2	15.0	33.9	53.1	24.3	20.5
Often	6.8	4.6	2.1	6.9	6.2	4.7	3.1
Usually	2.3	6.4	1.8	3.2	5.3	4.0	3.9
Total	88	388	333	248	113	1170	127

When farmers were asked if canals become blocked because of wastes, a different pattern was observed. Overall, 38 percent of farmers said that their canals were at least sometimes blocked. The percentage differs significantly by region: from 58 percent in Upper Egypt to 17 percent in East Delta.

In areas with a drainage network which is either open or partially open, 67 percent of farmers say the drains are never or rarely blocked, while 24 percent say they are sometimes blocked. There are significant differences by region, varying from 53 percent of farmers in Upper Egypt reporting occasional blockages to 15 percent in the East Delta.

Farmers were asked whether water flows in canals and *mesqas* on schedule and, if not, what prevents it from running on schedule.
In Table 7.5, 77 percent of farmers in Egypt said that water always or usually flows in the canals on schedule, while only 5 percent say that the water rarely or never flows on schedule in canals. This is reassuring. There are significant differences by region: 86 percent of farmers in East Delta say that the water usually or always flows on schedule in the canal, compared to 64 percent in Middle Egypt.

Table 7.5: Percent distribution of farmers according to the likelihood of water flowing on schedule in canals and *mesqas*, and reasons for water not flowing on schedule by region, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Water flow in canal on schedule?							
Always	77.0	71.8	76.2	43.4	54.8	64.4	67.0
Usually	3.3	9.8	10.0	21.3	15.3	12.4	14.4
Sometimes	15.7	16.4	8.9	26.0	22.8	17.8	16.0
Rarely	3.3	0.5	3.0	6.2	5.6	3.6	1.6
Never	0.7	1.6	1.9	3.1	1.6	1.8	0.5
If water not always on schedule							
Reason for not flowing on schedule							
Deficiency of water	84.1	66.9	69.6	85.9	68.4	76.0	80.6
Hasn't been cleaned	33.3	12.9	44.1	32.3	26.9	28.4	19.4
Throwing garbage	11.1	43.5	8.8	11.4	9.4	16.8	22.6
Weeds / water plant	3.2	8.1	20.6	24.5	26.9	19.3	16.1
Dead animals	1.6	3.2	0.0	0.5	1.2	1.1	0.0
Other	4.8	0.0	3.9	2.3	7.0	3.2	1.6
Water flow in *mesqa* on schedule?							
Always	38.7	32.7	36.8	31.4	59.3	39.5	38.3
Usually	9.5	9.8	13.1	19.8	12.2	13.0	12.8
Sometimes	39.1	47.5	35.2	32.9	19.6	35.0	39.4
Rarely	9.9	6.6	9.3	10.0	6.1	8.3	6.4
Never	2.9	3.4	5.6	5.9	2.9	4.2	3.2
If water not always on schedule							
Reason for not flowing on schedule							
Deficiency of water	83.9	86.5	87.1	85.0	77.9	84.7	84.5
Hasn't been cleaned	31.0	29.1	35.4	25.5	20.1	28.1	21.6
Trash, solid waste	23.2	35.5	8.9	5.2	7.8	16.9	18.1
Weeds / water plants	7.1	11.8	11.1	27.3	20.1	14.9	7.8
Dead animals	1.8	3.7	5.9	4.5	2.6	3.8	1.7
Other	0.6	0.0	1.8	1.1	4.5	1.5	1.7
Total	274	440	429	389	378	1910	188

The main reason why water does not flow in canals on schedule was the lack of water, cited by 76 percent of those who said that the water does not always flow on schedule in canals. A further 28 percent cited the fact that the canal hadn't been cleaned. The pattern of reasons differed by region. For example, garbage was cited by 44 percent of farmers in Middle Delta, compared to 9 percent in East Delta; and weeds were cited by 27 percent of farmers in Upper Egypt compared to 3 percent in West Delta.

The picture for water running in *mesqas* on schedule is not as reassuring. In almost half of the *mesqas* (48 percent), water does not usually or always run on schedule. There are significant differences by region, from 58 percent in Middle Delta saying it's unlikely to flow on schedule to 29 percent in Upper Egypt.

The main reasons why water does not flow in *mesqas* on schedule were lack of water and lack of cleaning. Table 7.6 presents the differential between farmers by the location of their *mesqa* on the canal.

Table 7.6: Percent distribution of farmers according to the likelihood of water flowing on schedule in canals and *mesqas* by location of *mesqas* on canals, KAP Survey 1998.

Variable & Category	Male		Total
	Mesqa location		
	At the Beginning	At the End	
Water flow in canal on schedule?			
Always	70.8	56.5	64.4
Usually	12.1	12.6	12.4
Sometimes	14.7	21.6	17.8
Rarely	1.6	6.1	3.6
Never	0.8	3.2	1.8
If water not always on schedule			
Reason for not flowing on schedule			
Deficiency of water	66.9	83.4	76.0
Hasn't been cleaned	28.4	28.5	28.4
Garbage	22.8	11.9	16.8
Weeds / water plant	17.5	20.8	19.3
Dead animals	2.1	0.2	1.1
Other	3.9	3.0	3.2
Water flow in *mesqa* on schedule?			
Always	45.1	32.6	39.5
Usually	15.2	10.3	13.0
Sometimes	32.2	38.6	35.0
Rarely	5.1	12.1	8.3
Never	2.5	6.4	4.2
If water not always on schedule			
Reason for not flowing on schedule			
Deficiency of water	80.3	89.3	84.7
Hasn't been cleaned	29.9	26.4	28.1
Trash, solid	20.8	13.0	16.9
Weeds / water plants	14.4	15.5	14.9
Dead animals	4.1	3.5	3.8
Other	1.2	1.6	1.5
Total	1054	856	1910

Farmers at the beginning of a canal were significantly more likely to find water in the canal on schedule than those at the end of a canal. At the beginning of a canal, 83 percent of farmers said that the water usually or always runs on schedule, compared to 69 percent of those at the end of a canal. The main reason for not flowing on schedule was lack of water, cited by 76 percent of respondents, which is a bigger problem at the end of a canal than at the beginning. On the other hand, trash seems to be a bigger problem at the beginning of canals than at the end.

Farmers at the beginning of a canal were also significantly more likely to find water in their *mesqa* on schedule than those at the end of a canal. Sixty percent of farmers at the beginning of canals said that water was usually or always in the *mesqa* on schedule, compared to 43 percent of farmers at the end of canals. The main reason for not having enough water, cited by 85 percent of those who said water was not always on schedule in the *mesqa*, was lack of water. Again, farmeres perceive trash in the *mesqa* to be a bigger problem at the beginning of the canal than at the end.

Table 7.7 presents the likelihood of water flowing in canals and *mesqas* by location of farm on the *mesqa*. None of these differences is significant.

7.3 Problems with Water Quality

Pollution problems are constantly on the minds of farmers. Farmers were asked about the contamination of *mesqa*s and the sources of these contaminants. They were also asked how to prevent *mesqa*s from becoming contaminated and about the cleaning of canals and *mesqa*s. Tables 7.8, 7.9 and 7.10 present the farmers' views on contamination by region, location of the *mesqa* on the canal and location of land on the *mesqa*, respectively.

When asked whether the water in the *mesqa* was clean or contaminated, 46 percent of male farmers and 40 percent of female farmers reported that the water was contaminated (see Table 7.8). These percentages differed significantly by region, ranging from 68 percent in the Middle Delta to 27 percent in Middle Egypt.

Table 7.7: Percent distribution of farmers according to the likelihood of water flowing on schedule in canals and *mesqa*s by land location on *mesqa*s, KAP Survey 1998.

Variable & Category	Male			
	Land location on the *mesqa*			Total
	At the Beginning	At the Middle	At the End	
Water flow in canal on schedule?				
Always	65.1	64.0	64.0	64.4
Usually	10.8	13.2	13.2	12.4
Sometimes	18.5	17.3	17.6	17.8
Rarely	2.9	4.2	3.7	3.6
Never	2.7	1.2	1.5	1.8
If water not always on schedule				
Reason for not flowing on schedule				
Deficiency of water	79.1	71.4	77.2	75.9
Hasn't been cleaned	28.9	29.8	26.6	28.4
Throwing garbage	16.6	16.9	17.0	16.8
Weeds / water plant	17.0	21.8	18.9	19.3
Dead animals	0.4	1.2	1.5	1.1
Other	2.6	5.2	2.3	3.3
Water flow in *mesqa* on schedule?				
Always	39.9	39.5	39.0	39.5
Usually	12.1	13.5	13.3	13.0
Sometimes	35.2	33.4	36.7	35.0
Rarely	8.6	9.4	6.6	8.3
Never	4.1	4.2	4.4	4.2
If water not always on schedule				
Reason for not flowing on schedule				
Deficiency of water	85.7	83.1	85.4	84.7
Hasn't been cleaned	26.4	29.9	28.0	28.1
Trash, solid	16.3	16.4	17.9	16.9
Weeds / water plants	13.3	16.2	15.2	14.9
Dead animals	5.2	3.1	3.1	3.8
Other	0.9	1.7	1.5	1.5
Total	659	659	592	1910

Table 7.8: Percent distribution of farmers by level of water pollution in *mesqa*s by region, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
***Mesqa* Status**							
Clean	47.8	31.8	50.3	73.5	67.5	53.8	59.6
Contaminated	52.2	68.2	49.7	26.5	32.5	46.2	40.4
Among farmers whose mesqa is contaminated							
Source of contamination (multiple responses possible)							
Bacteria (bilharizia & e-coil)	4.9	6.7	4.2	8.7	8.9	6.1	2.6
Pesticide & fertilizer residue	1.4	0.0	0.0	1.1	4.1	0.9	1.3
Household wastewater, soap residue	92.3	78.0	44.6	83.4	69.9	72.2	77.6
Industrial waste	5.6	5.7	24.4	7.5	8.9	10.3	6.6
Sewage	32.2	38.0	76.1	20.4	18.7	40.8	32.9
Dead animal	33.6	13.3	9.9	21.5	56.1	22.3	18.4
Drainage water	1.4	20.3	15.0	3.8	1.6	11.5	11.8
Other	0.0	2.3	0.0	5.7	9.7	2.9	3.9
Methods of preventing contamination (multiple responses possible)							
Lay sewer line	9.1	11.1	30.4	3.6	2.9	12.0	11.7
Clean *mesqa*	50.7	37.0	64.3	64.7	51.6	53.3	50.0
Fine for throwing garbage/dead animal	61.3	33.0	21.3	42.5	51.9	39.3	31.4
Cover *mesqa*	8.4	27.0	7.9	3.1	1.6	10.3	11.2
Cleaning canal	5.1	4.1	3.7	3.4	6.3	4.6	5.9
Other	2.2	14.1	6.1	2.6	6.7	6.8	4.8
Don't know	0.0	0.2	0.9	1.3	6.6	1.8	5.9
Who is responsible for cleaning *mesqa*? (multiple responses possible)							
Irrigation engineer	15.7	7.0	7.2	15.9	16.4	12.0	9.0
Agricultural engineer	2.6	0.2	0.2	1.0	0.0	0.7	0.5
Agricultural cooperative	76.3	74.8	35.7	51.4	4.5	47.5	46.8
Farmers	14.6	56.8	69.5	60.4	66.4	56.2	60.1
Other	0.0	0.0	0.2	4.4	22.5	5.4	2.6
Total	274	440	429	389	378	1910	188
Among those whose canal was cleaned in the previous year							
Quality of canal cleaning							
Good	73.6	71.7	79.2	78.5	81.1	76.9	82.4
Moderate	16.2	18.1	14.0	15.0	8.9	14.6	16.3
Bad	10.2	10.3	6.9	6.5	10.0	8.6	1.3
Total	197	360	394	307	259	1517	153
Among those whose mesqa was cleaned in the previous year							
Quality of *mesqa* cleaning							
Good	71.3	72.3	81.8	85.8	92.9	81.1	80.4
Moderate	17.4	18.1	11.9	12.3	4.6	12.7	16.1
Bad	11.3	9.6	6.3	2.0	2.5	6.2	3.6
Total	230	376	396	302	324	1628	168

Respondents who said their *mesqas* were contaminated were asked about specific contaminants. The contaminants in *mesqa*s mentioned most often were household wastewater (by 72 percent of male farmers and 78 percent of female farmers), sewage (41 and 33 percent, respectively), and dead animals (22 and 18 percent, respectively). By region, sewage was a big problem in East Delta and a less important problem in Upper Egypt. Household wastewater was cited by almost every respondent in West Delta (92 percent) and by fewer than half (45 percent) in East Delta.

Farmers were also asked how to prevent contamination of *mesqa*s. Cleaning *mesqa*s was the method mentioned by more than half of farmers, followed by imposing a fine for throwing garbage and animals in *mesqa*s. Some 10 percent of farmers suggested establishing a sewage system as a way to prevent contamination.

When asked whose responsibility it is to clean the *mesqa,* half of farmers said that it was farmers' responsibility (56 percent), and half that it was the responsibility of the agricultural cooperative (48 percent). Regionally, it is interesting that only 15 percent of farmers in West Delta recognized that it is their responsibility to clean the *mesqa,* compared to majorities in the other four regions. Farmers in West Delta and in Middle Delta are highly likely to put the responsibility on the agricultural cooperative. These responses are presented graphically in Figure 7.2.

Farmers were asked if their canals and *mesqas* had been cleaned in the last year and, if so, how good was the cleaning. It is reassuring that the majority of respondents felt that both types of waterways were well cleaned – 77 percent for canals and 81 percent for *mesqas.* However, there were significant differences by region, minor at the canal level, but larger at the *mesqa* level. At the *mesqa* level, the proportion of farmers who said that their *mesqa* cleaning was of bad quality varied from 2 percent in Middle Egypt to 11 percent in West Delta.

Tables 7.9 and 7.10 review these same variables by location of *mesqa* on the canal and location of farm on the *mesqa.* The only significant difference is the quality of canal cleaning by location of *mesqa* on the canal: it was substantially higher at the beginning of canals than at the end.

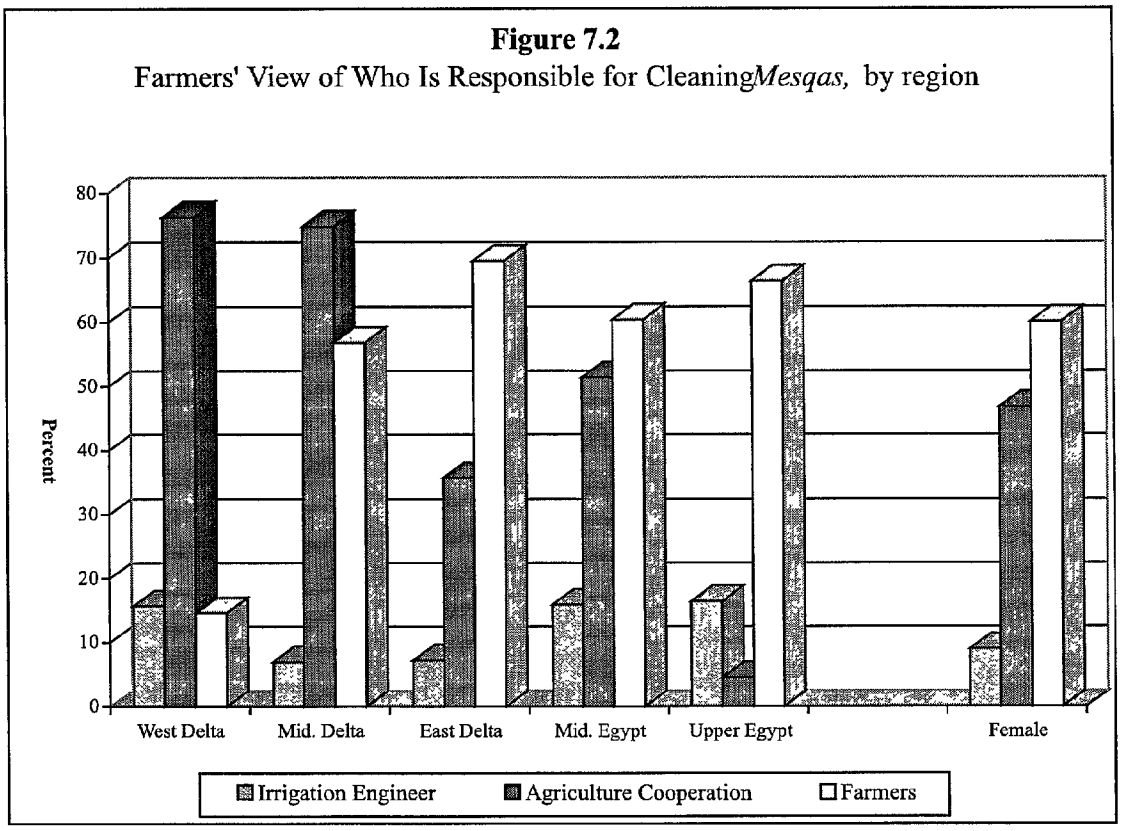
Table 7.9: **Percent distribution of farmers by level of water pollution in *mesqa*s by location of *mesqa* on canal, KAP Survey 1998.**

Variable & Category	Male		
	Mesqa location		
	At the Beginning	At the End	Total
***Mesqa* Status**			
Clean	54.3	53.3	53.8
Contaminated	45.7	46.7	46.2
Among those whose mesqa is contaminated			
Source of contamination			
(multiple responses possible)			
Bacteria (bilharizia & e-coli)	6.2	5.9	6.3
Pesticide & fertilizer residue	1.0	0.9	0.9
Household wastewater, soap residue	73.7	70.5	71.6
Industrial waste	12.7	7.5	10.6
Sewage	41.3	40.2	41.6
Dead animal	24.8	19.4	22.7
Drainage water	8.8	14.6	11.5
Other	4.1	1.6	2.8
Methods of preventing contamination			
(multiple responses possible)			
Lay sewer line	12.5	11.3	12.0
Clean *mesqa*	53.3	53.9	53.6
Fine for throwing garbage/dead animal	40.5	39.5	40.1
Cover *mesqa*	11.2	8.9	10.2
Cleaning canal	4.4	4.6	4.5
Other	6.4	7.3	6.8
Don't know	1.7	2.0	1.8
Who is responsible for cleaning *mesqa*?			
(multiple responses possible)			
Irrigation engineer	12.0	11.9	12.0
Agricultural engineer	0.7	0.7	0.7
Agricultural cooperative	47.8	47.2	47.5
Farmers	57.0	55.3	56.2
Other	4.4	6.6	5.4
Total	1054	856	1910
Among those whose canal was cleaned in the previous year			
Quality of canal cleaning			
Good	78.9	74.2	76.9
Moderate	14.1	15.2	14.6
Bad	7.0	10.6	8.6
Total	866	651	1517
Among those whose mesqa was cleaned in the previous year			
Quality of *mesqa* cleaning			
Good	81.2	80.9	81.1
Moderate	13.9	11.3	12.7
Bad	4.9	7.8	6.2
Total	885	743	1628

Table 7.10: Percent distribution of farmers by level of water pollution in *mesqa*s by position of land on *mesqa*, KAP Survey 1998.

Variable & Category	Male			
	Land location on the *mesqa*			Total
	At the Beginning	At the Middle	At the End	
***Mesqa* status**				
Clean	56.3	51.9	53.2	53.8
Contaminated	43.7	48.1	46.8	46.2
Among those whose mesqa is contaminated				
Source of contamination				
(multiple responses possible)				
Bacteria (bilharizia & e-coli)	5.9	7.9	5.1	6.3
Pesticide & fertilizer residue	0.5	1.2	1.1	0.9
Household waste- water, soap residue	72.9	68.8	73.9	71.6
Industrial waste	12.1	12.3	7.3	10.6
Sewage	43.5	38.9	42.5	41.6
Dead animal	22.2	24.5	20.9	22.7
Drainage water	10.1	12.6	11.5	11.5
Other	2.5	3.5	2.1	2.8
How to prevent *mesqa* contamination				
(multiple responses possible)				
Lay sewer line	11.2	12.7	12.0	12.0
Clean *mesqa*	52.7	55.4	52.5	53.6
Fine for throwing garbage/dead animal	41.9	40.1	38.0	40.1
Cover *mesqa*	9.9	10.2	10.5	10.2
Cleaning canal	4.6	4.2	4.6	4.5
Other	5.9	6.6	8.3	6.8
Don't know	1.8	1.7	2.0	1.8
Who is responsible for cleaning the *mesqa*?				
(multiple responses possible)	13.4	10.9	11.7	12.0
Irrigation engineer	0.5	1.1	0.5	0.7
Agriculture engineer	44.9	49.0	48.8	47.5
Agriculture cooperation	56.1	56.3	56.3	56.2
Farmers	4.7	5.8	5.7	5.4
Other				
Total	659	659	592	1910
Among those whose canal was cleaned the previous year				
Quality of canal cleaning				
Good	76.4	75.3	79.1	76.9
Moderate	14.3	16.5	112.7	14.6
Bad	9.2	8.2	8.2	8.6
Total	530	522	465	1517
Among those whose mesqa was cleaned the previous year				
Quality of *mesqa* cleaning				
Good	81.0	80.4	82.0	81.1
Moderate	12.5	12.5	13.2	12.7
Bad	6.6	7.1	4.8	6.2
Total	562	566	500	1628

Figure 7.2
Farmers' View of Who Is Responsible for Cleaning*Mesqas,* by region



7.4 Consequences of Irrigation and Drainage Problems

The sufficiency of irrigation water and the availability of drainage systems are very important for both the land and crops. Farmers were asked if they experienced any shortage of water or drainage problems. Tables 7.11, 7.12 and 7.13 show the extent of these problems and their effects by region, position on the canal and position on the *mesqa*, respectively.

Around 14 percent of farmers had drainage problems. This proportion varied significantly by region, from 24 percent in East Delta to only 8 percent in Middle Egypt.

More than half of the farmers (54 percent) lost crops due to lack of water, with significant differences by region: from 33 percent in Upper Egypt to 73 percent in East Delta.

Only 8 percent of all farmers left their lands fallow due to lack of water, again with significant variation by region: from 5 percent in Middle Delta to 15 percent in Middle Egypt. Among those who left land fallow, 94 percent left land fallow only in the summer, with no significant variation by region. However there was a significant difference in the amount of land left uncultivated. Among farmers who left land fallow due to lack of water, the mean area left fallow was 1.2 feddans, ranging from 0.55 in West Delta to 2.22 in Middle Delta.

Tables 7.12 and 7.13 present these same variables by position of *mesqa* on canal and position of land on *mesqa*, but there are no significant differences in these tables.

Table 7.11: Percent distribution of farmers according to irrigation and drainage problems by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Having drainage problems	11.3	10.9	23.5	7.5	13.2	13.6	7.4
Lost crops due to lack of water	58.0	58.6	72.7	45.2	33.3	54.0	57.4
Left land fallow due to an inadequate water	5.8	5.0	6.5	14.9	6.3	7.7	6.9
Among those who left land fallow							
When was land left fallow?							
Summer	100.0	96.0	89.2	96.5	87.5	93.5	100.0
Summer & winter	0.0	4.0	10.8	3.5	12.5	6.5	0.0
Among those who left land fallow							
Area left uncultivated							
< 1	67.8	18.0	44.4	63.8	95.3	59.0	76.8
1 –	25.4	60.0	55.6	26.2	0.0	32.0	23.2
3 +	6.8	22.0	0.0	10.1	4.7	9.0	0.0
Mean	0.55	2.22	0.87	1.50	0.42	1.22	0.55
Total	274	440	429	389	378	1910	188

Table 7.12: Percent distribution of farmers according to irrigation and drainage problems by *mesqa* location, KAP Survey 1998.

Variable & Category	Male		
	Mesqa location		Total
	At the Beginning	At the End	
Having drainage problems	13.9	13.1	13.6
Lost crops due to lack of water	46.4	63.3	54.0
Left land fallow due to an inadequate water	7.1	8.5	7.7
Among those who left land fallow			
When was land left fallow?			
Summer	90.3	97.6	93.5
Summer & winter	9.7	2.4	6.5
Among those who left land fallow			
Area left uncultivated			
< 1	62.0	4.8	59.0
1 –	28.2	3.0	32.0
3 +	9.9	0.7	9.0
Mean	1.38	1.06	1.22
Total	1054	856	1910

Table 7.13: Percent distribution of farmers according to irrigation and drainage problems by land location, KAP Survey 1998.

Variable & Category	Male			
	Land location on the *mesqa*			Total
	At the Beginning	At the Middle	At the End	
Having drainage problems	12.1	15.2	13.3	13.6
Lost crops due to lack of water	54.8	54.3	52.7	54.0
Left land fallow due to an inadequate water	8.2	7.3	7.8	7.7
Among those who left land fallow				
When was land left fallow?				
Summer	90.2	95.8	96.1	93.5
Summer & winter	9.8	4.2	3.9	6.5
Among those who left land fallow				
Area left uncultivated				
< 1	54.3	67.1	56.4	59.0
1 –	35.8	24.7	34.6	32.0
3 +	9.9	8.2	9.0	9.0
Mean	1.22	1.48	0.97	1.22
Total	659	659	592	1910

Figure 7.3

Proportion of farmers who lost crops due to lack of water

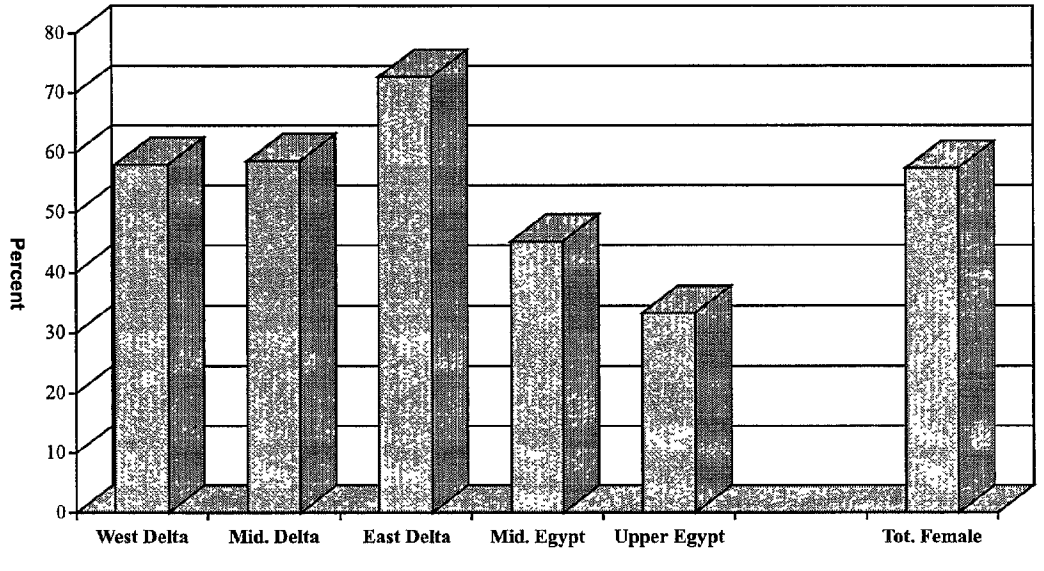


Figure 7.3 shows the proportion of farmers who lost crops due to lack of water by region. Farmers in Delta regions are more likely to lose crops due to lack of water than farmers in other regions.

Chapter 8

Women's Role in Agriculture and Irrigation

Responses are tabulated from the 355 wives interviewed in their homes. Their husbands were interviewed in their fields. Due to the relatively small sample size, this analysis is not provided at the regional level, although some regional differences do exist and we will touch on these where possible. There is a surprisingly high level of agreement within couples about women's role in agriculture and irrigation. This chapter compares husbands' and wives' responses on key issues in four areas: knowledge, women's role in irrigation, irrigation problems and communication. A few key items are included for questions which were asked of women, but not of their husbands.

8.1 Knowledge[1]

Table 8.1 suggests a high level of agreement within couples about Water User Associations: similar proportions of farmers and their wives have heard about them, and the same proportion say that the farmer (or husband) would join a WUA if one were formed nearby.

Wives are not as knowledgeable as their husbands about the advantages of night irrigation: in fact more than half of wives say they simply "don't know" the advantages. While 59 percent of farmers know that night irrigation requires less water or entails lower losses to evaporation, only 17 percent of their wives know this fact.

Majorities of husbands and their wives agreed that keeping the *mesqa* clean would increase productivity, and that water pollution reduces the quantity of water available.

[1] Wives' knowledge of national water issues is tabulated in Table 4.1.

Table 8.1: Percent distribution of comparative responses from farmers and their wives concerning knowledge of irrigation, KAP Survey 1998.

	Husbands	Wives
Heard of WUA	4.2	2.0
Husband would join a WUA	74.8	75.2
Advantages of night irrigation		
Requires less water	45.9	16.7
Fewer problems with farmers	3.4	4.2
Less evaporation	13.0	0.0
No advantages	53.5	18.1
Land is cold/fall down	11.3	6.9
Other	1.1	0.0
Don't know	1.4	58.3
If the *mesqa* were cleaned frequently, this would increase the water available and therefore productivity	94.6	88.2
Pollution does reduce quantity of irrigation water available	84.8	82.8
Total	355	355

8.2 Women's Role in Irrigation

Very similar proportions of farmers and their wives say that the wife helps in agriculture and irrigation – 38 percent of farmers and 43 percent of their wives (see Table 8.2). There is a substantial disparity between Upper Egypt and the other four regions. In Upper Egypt, about 9 percent of wives report helping their husbands in agriculture and irrigation, compared to about 47 percent in the remaining four regions (not shown in the table). Among those who say that the wife does help, there was almost perfect agreement within couples as to her specific tasks: almost all say that wives help in cultivation, just over half say wives help with livestock, and almost a third say that wives help in irrigation. And finally, there is even perfect agreement within couples about the number of hours wives work on these tasks – 22 hours per week.

Table 8.2: Percent distribution of comparative responses from farmers and their wives concerning wife's role in agriculture and irrigation, KAP Survey 1998.

	Husbands	Wives
Wife helps in agriculture and irrigation	38.2	43.4
Among those who say wife helps		
Tasks she does		
Helps in irrigation	31.1	31.2
Helps in cultivation	88.1	87.7
Rearing livestock	57.0	55.2
Supervising laborers	1.5	2.6
Other	0.7	0.0
Among those who say wife helps		
Mean number of hours wife works per week	21.6	21.9
Total	355	355

8.3 Irrigation Problems

Table 8.3 suggests generally good agreement between the responses of farmers and their wives about irrigation problems that farmers face. While wives are aware of general problems with shortages of water, some wives are not as knowledgeable about the details of the water schedule.

Most wives knew that their husbands' biggest problem in the summer was lack of water, but not as many were aware that irregular shifts (water not being available on schedule) was also a problem for some. Almost identical proportions of farmers and their wives said that there was no problem.

When asked if water flowed in the *mesqa* on schedule, there was general agreement between the responses of farmers and their wives, but 11 percent of wives didn't know whether the water was available on schedule or not. Among those who said it was not always on schedule, similar proportions cited the same reasons for this, while again 14 percent of wives said they didn't know what prevented water from coming on schedule.

Similar proportions of farmers and their wives felt that the water in the *mesqa* was clean, at just over half of respondents, while a small fraction of wives didn't know whether it was clean or polluted. Among those who said the water was contaminated, there was general agreement between husbands and wives that the main contaminants were household wastewater and soap residue, sewage, and dead animals. Wives were not as knowledgeable about industrial waste or drainage water as pollutants.

Table 8.3: Percent distribution of comparative responses from farmers and their wives concerning irrigation problems, KAP Survey 1998.

	Husbands	Wives
Main problem in summer		
Lack of water	78.9	65.9
Irregular shifts	12.4	3.7
High cost of irrigation	1.7	0.8
Salinity of water	3.4	3.7
No problem	17.7	17.2
Other	1.4	0.9
Don't know	0.0	13.5
Does water flow in the *mesqa* on schedule		
Always	43.1	37.4
Usually	14.6	15.0
Sometimes	31.8	26.1
Rarely	5.6	7.6
Never	4.8	2.5
Don't know	0.0	11.3
Among those who said not always on schedule		
Why doesn't it flow on schedule		
Lack of water	85.6	65.5
Mesqa hasn't been cleaned out	30.2	20.6
Garbage	16.8	19.3
Weeds, water plants	14.4	7.2
Dead animals	3.0	1.3
Other	2.0	0.9
Don't know	0.0	13.5
Quality of water in *mesqa*		
Clean	54.4	58.3
Contaminated	45.6	37.2
Don't know	0.0	4.5
Among those who said contaminated		
What are the contaminants		
Bacteria	4.9	6.1
Household wastewater, soap	74.1	62.8
Industrial waste	14.2	6.1
Sewage	37.7	26.4
Dead animals	18.5	20.9
Drainage water	13.6	8.8
Others	3.7	4.1
Don't know	0.0	5.4
How can *mesqa* pollution be prevented		
Lay sewer line	9.6	6.2
Clean the *mesqa*	55.8	52.1
Fines	39.7	33.5
Cover the *mesqa*	9.0	4.8
Clean the canal	4.5	5.9
Other	6.7	3.1
Don't know	1.4	15.5
Wife throws wastes in *mesqa*	N/A	2.0
Wife washes in the *mesqa*	N/A	11.3
Total	355	355

When asked how this pollution could be prevented, respondents were in agreement that the main way was to simply clean the *mesqa*, followed by fines for people who throw trash or dead animals in the *mesqa*. Sixteen percent of wives did not know how this pollution could be prevented.

Only two percent of farmers' wives admitted that they threw trash in the *mesqa*, while 11 percent said that they did do some washing in the *mesqa*.

Farmers' wives are slightly less exact in their knowledge of the consequences of these irrigation problems. While 51 percent of farmers say they lost crops the previous year due to lack of water, only 39 percent of wives knew this. However, a similar proportion of wives knew that their husbands had left land fallow the previous year due to lack of water (8 percent and 7 percent). Among those who left land fallow due to lack of water, wives' average estimates of the number of feddans left fallow exceeded those of their husbands (2.9 feddans compared to 2.3 feddans).

Table 8.4: Percent distribution of comparative responses from farmers and their wives concerning the consequences of irrigation problems, KAP Survey 1998.

	Husbands	Wives
Husband lost crops last year due to lack of water	50.7	39.4
Husband left land fallow last year due to lack of water	8.2	6.5
Among those who left land fallow **Mean number of feddans fallow**	2.3	2.9
Total	355	355

8.4 Communication[2]

Data on how much farmers and wives talk together about agriculture and irrigation is strikingly comparable. Half of the respondents said that they talk to their spouses about agriculture or irrigation, and their spouses agreed. A similar proportion said that they talk about the costs of agriculture or irrigation.

Wives were asked what they usually advise their husbands when they are discussing lack of water of irrigation. While 14 percent of women don't know how to advise their husbands, those who do may advise their husband to check with the irrigation engineer, with other farmers or with the agricultural cooperative. This pattern of communication is very similar to that suggested by male farmers when asked from whom they would seek help with an irrigation problem (see Table 9.7).

It is fascinating that husbands and wives report the same weight attributed to wives' views on agriculture and irrigation. Fewer than 10 percent seriously consider their wives' suggestions in these matters, and the balance of farmers are split between occasionally considering these suggestions and not considering them at all.

[2] Wives' access to television and radio is tabulated in Tables 9.1 and 9.2.

Finally, only a minority of wives, 12 percent, said that they felt they could influence their husbands to change an irrigation behavior if it were wrong.

Table 8.5 Percent distribution of comparative responses from farmers and their wives concerning husband-wife communication, KAP Survey 1998.

	Husbands	Wives
Talks to spouse about agriculture or irrigation	50.4	48.7
Talks to spouse about costs of agriculture or irrigation	51.3	49.0
If husband mentions lack of water, what do you advise him?		
Grow crop requiring less water	N/A	5.6
Use underground water		5.4
Ask irrigation engineer		18.6
Ask other farmers/relatives		18.3
Ask agricultural cooperative		17.7
Ask the *bahar*		5.6
Irrigate from the drain		5.9
Other		19.7
Don't know		14.4
Husband's reaction to wife's suggestion about agriculture or irrigation		
Take into consideration	9.9	7.0
Sometimes take into consideration	45.9	47.9
Don't take into consideration	44.2	44.8
Don't know	0.0	0.3
Can convince husband to change wrong irrigation behavior	N/A	11.5
Total	355	355

Chapter 9

Communication

Changes in knowledge, attitudes and practices on a national scale are effected through large-scale communication efforts. It is important to be able to select communication channels which will make this effort cost-effective. For example, it is generally acknowledged that mass media can be effective in stimulating preliminary changes in knowledge, attitudes and practices, but that the target audience will also benefit substantially by interpersonal communication. This chapter reviews the findings of the study as they relate to farmers' access to mass media and, on the interpersonal level, communication between farmers and district irrigation engineers. Finally, farmers' patterns of information seeking are analyzed.

9.1 Access to Mass Media

The KAP survey collected information on the exposure of farmers to both broadcast and print media. These data are important because they provide some indication of the extent to which Egyptian farmers are regularly exposed to mass media. The information can be used to determine the efficacy of using mass media to deliver water messages.

The level of exposure, preferred programs and exposure to certain programs on television, radio, and newspapers or magazines is shown in Tables 9.1, 9.2 and 9.3 for farmers (male and female) and the wives in the subsample.

Television

Around three-quarters of male farmers and their wives watch television, significantly more than female farmers (55 percent). There is a significant difference by region: viewership is highest in West Delta, at 84 percent of male farmers, and lowest in Upper Egypt, at 64 percent. The ownership pattern also differs significantly by region, with television ownership highest in West Delta and lowest in Middle Egypt.

> ***Channels:*** *Female farmers watch significantly less television (55 percent) than male farmers (72 percent).*

Table 9.1: Percent distribution of farmers by exposure to television by region and sex, KAP Survey 1998.

Variable & Category	Male						Wives Subsample	Female
	Region					Total		
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt			
Proportion who watch television	83.9	69.5	77.9	69.4	64.0	72.4	79.2	55.3
Proportion who own a television	92.0	81.1	83.1	78.7	82.8	83.0	83.0	64.4
Among those who watch television								
Mean number of hours watched daily	1.5	1.4	1.6	1.8	1.8	1.6	2.3	1.7
When do you watch television (multiple responses possible)								
Morning	10.9	4.2	6.0	7.8	10.3	7.7	11.7	9.6
Noon	3.0	1.6	2.1	4.8	4.1	3.0	7.5	2.9
Afternoon	0.9	2.3	3.6	10.7	9.1	5.2	11.7	5.8
Evening	77.8	68.0	54.5	41.5	63.2	59.7	58.4	51.0
Occasional	20.0	35.0	51.8	55.6	33.1	40.9	43.8	50.0
Type of programs preferred (multiple responses possible)								
Religious	35.7	27.8	33.5	38.1	31.8	31.7	24.9	11.5
Political	41.7	37.3	34.4	64.1	45.9	41.7	6.0	10.6
Cultural	10.0	6.9	10.2	29.6	34.7	17.0	12.5	9.6
Sports	15.7	12.4	13.2	18.9	10.7	13.2	0.0	1.0
Entertainment	56.1	69.0	60.5	57.8	55.0	61.9	88.6	85.6
Agricultural	47.4	47.4	56.9	52.6	31.0	47.2	36.7	38.5
Other	0.0	3.6	2.1	1.9	1.7	1.9	0.4	1.0
Programs watched								
Agricultural programs	90.9	91.5	92.5	94.8	86.6	91.3	79.7	79.8
Programs on water conservation	68.7	52.0	68.8	58.5	58.1	61.2	38.8	43.3
Programs on water pollution	67.4	57.2	60.4	61.9	53.3	59.9	40.2	42.3
Total	274	440	429	389	378	1910	355	188

On average, respondents watched an hour or two of television per day: 1.6 hours for male farmers and 1.7 hours for female farmers, and 2.3 hours for farmers' wives. Sixty percent of male farmers watch in the evening, while 41 percent watch television occasionally. Female farmers tend to have the same viewing pattern as male farmers.

According to the type of programs preferred, it appears that male farmers tend to prefer more serious programming than female farmers and wives. Male farmers tended to prefer entertainment programs, followed closely by agricultural, political, and religious programs. Female farmers mainly prefer entertainment programs, with agricultural programs a more distant second.

Respondents who watched television were asked whether they watched programs about agriculture, and whether they had ever seen anything about conserving irrigation water or

the pollution of irrigation water. All three proportions were significantly lower among female farmers than among males. Almost all-male respondents (91 percent) said they watch agricultural programs, but only 80 percent of females watch such programs. Around 60 percent of male farmers had ever seen anything on television about conserving irrigation water or pollution of irrigation water, compared to around 43 percent of female farmers.

When farmers who had seen these programs were asked what specifically they had seen on television about conserving irrigation water, 61 percent of male farmers and 64 percent of female farmers mentioned Secret of the Land (سر الأرض), a leading agricultural program. Forty-one percent of male farmers and 31 percent of female farmers mentioned television spots. When asked what specifically they had seen about pollution of irrigation water, 54 percent of male farmers and 50 percent of female farmers mentioned programs and spots about pollution; 39 percent of males and 36 percent of females mentioned programs on bilharzia; and 31 percent of male and 36 percent of female farmers mentioned Secret of the Land.

Radio

Table 9.2 presents exposure to radio by region and sex. Exposure to radio is quite different from exposure to television. It is clear from the table that radio has smaller reach among farmers and their wives than television. Around two-thirds of male farmers listen to the radio, compared to 40 percent of female farmers.

> ***Channel:*** *The proportion of female farmers who watch television and listen to the radio is significantly less than the proportion of male farmers.*

Among those who listen to the radio, male and female farmers listen to an equivalent number of hours per day, around one and a half hours. Whereas male farmers tend to watch television either in the evening or occasionally, they are more likely to listen to the radio in the morning (49 percent), occasionally (36 percent), or in the evening (27 percent). Male farmers preferred religious programs, followed by political programs. Interestingly, male farmers in Middle and Upper Egypt were more likely to mention listening to political programs (52 percent) than those in the Delta, particularly in Middle Delta (15 percent). Farmers' wives and female farmers mainly preferred religious programs, with entertainment programs a distant second.

Respondents who listened to the radio were asked whether they listened to agricultural program on the radio: around a third of male farmers and around a quarter of female farmers listen to such programs. Only 16 percent of farmers' wives listen to these programs. When asked exactly what they listen to about agriculture, 83 percent of male farmers and 85 percent of female farmers mentioned agricultural programs, and 13 percent of males and 10 percent of females mentioned radio spots.

Table 9.2: Percent distribution of the farmers by exposure to radio by region and sex, KAP Survey 1998.

Variable & Category	Male						Wives Subsample	Female
	Region					Total		
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt			
Proportion who listen to the radio	76.3	72.0	73.2	55.8	43.1	63.9	58.9	39.9
Among those who listen to the radio								
Mean number of hours daily	1.8	1.4	1.5	1.5	1.7	1.6	1.8	1.5
When do you listen (multiple responses possible)								
Morning	46.4	54.3	55.1	34.1	42.3	48.7	64.1	61.3
Noon	2.9	5.0	2.2	2.8	3.1	3.7	4.8	10.7
Afternoon	1.0	7.3	3.2	5.5	6.7	4.8	8.6	5.3
Evening	34.9	21.5	26.8	32.7	26.4	27.4	16.3	21.3
Occasional	31.6	31.2	35.7	46.5	38.7	36.0	34.0	33.3
Type of programs preferred (multiple responses possible)								
Religious	84.7	88.0	87.6	72.4	63.8	81.5	80.4	85.3
Political	20.1	14.5	23.9	51.6	51.5	28.2	5.7	8.0
Cultural	3.3	3.2	2.5	14.3	14.7	6.3	6.7	2.7
Sports	1.4	2.2	2.2	1.4	4.3	2.1	0.0	0.0
Entertainment	11.0	15.8	13.1	30.0	19.6	17.4	39.7	18.7
Agricultural	13.9	5.7	5.4	9.2	4.3	7.6	1.0	9.3
Other	0.0	2.8	1.3	1.8	3.7	1.8	1.0	0.0
Programs heard								
Agricultural programs	46.9	29.0	36.0	34.6	30.7	35.1	15.8	26.7
Programs on water conservation	34.4	18.0	22.0	22.1	23.3	23.3	6.7	9.3
Programs on water pollution	33.0	19.9	21.7	21.2	24.2	23.4	8.2	10.7
Total	274	440	429	389	378	1910	355	188

Print Media

Table 9.3 shows exposure to print media. Reflecting the high rates of illiteracy among farmers (Table 3.1 shows that 53 percent of male farmers have never attended school), fully 73 percent of male farmers and 96 percent of female farmers are either unable to read or do not read newspapers or magazines. Among those who read, this medium is very effective: around half of male farmers have ever read anything about conservation or pollution of irrigation water.

> ***Channel**: If print media are used for farmers, they must be designed for the non-literate.*

Table 9.3: Percent distribution of farmers by exposure to print media by region and sex, KAP Survey 1998.

Variable & Category	Male						Female
	Region					Total	
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt		
Time spent reading any journal/ newspaper							
Once a day	13.1	8.2	8.2	8.7	14.3	10.2	0.5
Weekly	20.4	6.4	9.3	13.4	10.1	11.2	1.1
Once every two weeks	2.6	1.1	2.6	2.8	1.6	2.1	1.1
Once every month	4.0	3.0	3.3	5.4	2.6	3.6	1.6
Do not read	19.3	22.0	9.1	19.0	14.0	16.5	7.4
Cannot read	40.5	59.3	67.6	50.6	57.4	56.3	88.3
Among those who ever read							
Subjects ever read about							
Agriculture	84.5	74.4	70.0	73.7	73.1	75.3	*
Conservation of irrigation water	56.4	58.5	33.0	57.6	54.6	52.1	*
Pollution of irrigation water	61.8	43.1	42.0	50.8	49.1	50.2	*
* Too few cases to analyze.							
Total	274	440	429	389	378	1910	188

9.2 Communication with Irrigation Engineers

Communication between farmers and irrigation engineers is important in order to solve irrigation, drainage and pollution problems. Farmers were asked if they had ever visited irrigation engineer, the number of visits and the reasons for those visits. Tables 9.4, 9.5, and 9.6 present the results. Female farmers are not included in the regional table because there were too few cases to analyze: only one female farmer had met with her irrigation engineer in the year preceding the survey.

As reported in Table 9.4, only 9 percent of all male farmers met with their irrigation engineer last year, and 8 percent were able to give his correct name. Among those who had met with their engineer in the year before the survey, the average number of meetings was five times higher in the summer than in the winter: five meetings compared to one meeting. This number differed by region, but not very significantly[1].

Farmers mainly seek their irrigation engineers for one thing: they don't have enough water. This reason was cited by 86 percent of those who had met their engineer in the year preceding the survey. Eight of ten farmers who sought their irrigation engineer found him responsive to their questions.

Tables 9.5 and 9.6 review the same data by position of *mesqa* on the canal and position of farm on the *mesqa*. In Table 9.5, farmers whose *mesqa* is at the beginning of a canal are significantly less likely to have met with their engineer in the summer than those at the end

[1] P=0.07

of a canal, while the mean for winter is not significantly different. In Table 9.6, the difference between the mean number of meetings is not significant for summer or winter.

Table 9.4: Percent distribution of farmers according to their communication with irrigation engineers by region, KAP Survey 1998.

Variable & Category	Male					
	Region					Total
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	
Met with irrigation engineer last year	11.7	9.5	12.4	9.3	4.5	9.4
Know the irrigation engineer's name	4.4	2.0	9.3	18.0	4.5	8.1
Among those who met with engineer last year						
Mean number of meetings with engineer						
Last summer	3.2	4.7	8.4	3.4	2.5	5.1
Last winter	0.9	0.4	0.8	0.7	1.6	0.8
Reason for visiting irrigation engineer (multiple responses possible)						
Clean the canal	9.4	9.5	9.7	5.4	6.7	8.5
Lack of water	84.6	86.3	94.4	80.6	71.1	86.2
Irrigation engineer answered questions	96.6	82.2	63.7	86.0	88.9	80.9
Total	274	440	429	389	378	1910

Table 9.5: Percent distribution of farmers according to their communication with irrigation engineers by location of mesqa, KAP Survey 1998.

Variable & Category	Male		
	Mesqa location		Total
	At the Beginning	At the End	
Met with irrigation engineer last year	9.7	9.1	9.4
Know the irrigation engineer's name	9.9	5.8	8.1
Among those who met with engineer last year			
Mean number of meetings with engineer			
Last summer	3.9	6.8	5.1
Last winter	0.9	0.6	0.8
Reason for visiting irrigation engineer (multiple responses possible)			
Clean the canal	10.3	5.5	8.5
Lack of water	81.4	91.2	86.2
Irrigation engineer answered questions	85.6	83.5	80.9
Total	1054	856	1910

Table 9.6: Percent distribution of farmers according to their communication with irrigation engineers by land location, KAP Survey 1998.

Variable & Category	Male			
	Land location on the Mesqa			Total
	At the Beginning	At the Middle	At the End	
Met with irrigation engineer last year	10.3	8.2	9.8	9.4
Know the irrigation engineer's name	8.5	8.0	7.6	8.1
Among those who met with engineer last year				
Mean number of meetings with engineer				
Last summer	6.4	3.8	4.9	5.1
Last winter	0.9	0.9	0.5	0.8
Reason for visiting irrigation engineer (multiple responses possible)				
Clean the canal	10.7	9.8	5.1	8.5
Lack of water	90.3	85.4	80.6	86.2
Irrigation engineer answered questions	83.5	75.6	82.7	80.9
Total	659	659	592	1910

9.3 Information on Crops, Water and Prices

Farmers need a large amount of information to guide them in decisions about which crops to grow, how to irrigate them and how to sell them. Table 9.7 reviews data showing gaps in farmers' information which might be addressed by a communication intervention. Data in this table are provided for male farmers only, due to the small number of female farmers.

Crops

When asked if they had the information they needed to select new crops, only about a third of farmers said they did have this information. While there were some differences by region, the pattern was generally similar across regions. About half of the farmers said they had information about when to grow crops. This percentage varied from 33 percent in Upper Egypt to 76 percent in Middle Egypt. A surprising majority of farmers (88 percent) said that they had information about how much water was needed by new crops, and this pattern was consistent across regions.

When asked if they seek advice from anyone about which crops to grow, only 29 percent said yes. Among farmers who do seek such advice, about half speak to other farmers, while one in five seek information from the agricultural cooperative or the agricultural engineer (or agricultural extension officer). It is interesting that such a small proportion of farmers seek advice from the agricultural engineer, considering that there are so many agricultural engineers (about 100 per district compared to one irrigation engineer). In determining how to reach the large number of farmers who constitute GreenCOM's main target audience, the project may wish to consider whether it is cost-effective to work through groups such as agricultural cooperatives (about 50-60 per district).

> ***Channel**: The official source from whom farmers seek information is the agricultural cooperative.*

Water

Farmers are generally less well informed about water than about crops. About half of farmers have obtained information about how to irrigate crops, varying from 34 percent in Upper Egypt to 76 percent in Middle Egypt. Less than half of farmers have obtained information about how much water to use per irrigation, varying again from 31 percent in Upper Egypt to 72 percent in Middle Egypt. Only a minority of farmers (15 percent) have information about *mesqa* maintenance. When asked from whom they would seek assistance with an irrigation problem, 60 percent of farmers mentioned the irrigation engineer. This is the only time the irrigation engineer was mentioned as a source of information. About a quarter of farmers seek this assistance from the agricultural cooperative and 11 percent from other farmers.

> ***Message**: Your irrigation engineer has information about how to maintain the mesqa.*

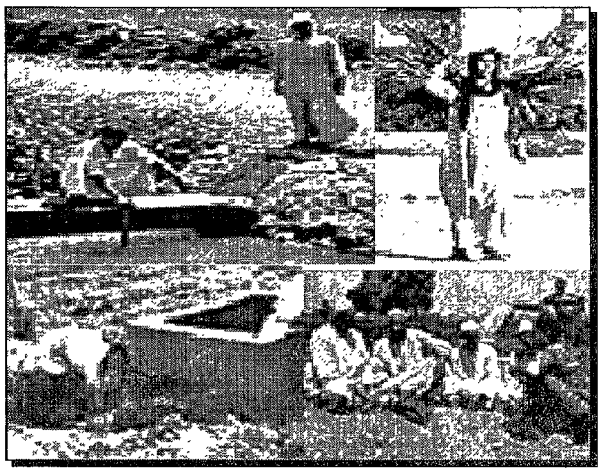
Prices

Price information is key if farmers are to make appropriate decisions about their land productivity. Only 64 percent of farmers said they had the information they needed to estimate the price of crops at harvest time. Among those who did have such information, the main source was merchants, but there was a substantial difference by region. Farmers in West Delta rely heavily on merchants (93 percent), compared to those in Middle Egypt (42 percent). The agricultural cooperative and personal experience come a distant second, at around 23 percent of farmers. Again there is a substantial difference by region: almost no West Delta farmers rely on their own experience for prices, whereas 56 percent of farmers in Middle Egypt do so. A small proportion of farmers (14 percent) seek price information from other farmers.

> *Channel: Consider an agricultural/ irrigation news program with "marketplace" topics.*

Table 9.7: Percent distribution of farmers according to their information about crops, water and prices by region, KAP Survey 1998.

Variable & Category	Male					
	Region					Total
	West Delta	Middle Delta	East Delta	Middle Egypt	Upper Egypt	
Crops						
Have info needed to select new crops	44.5	25.9	39.9	42.7	28.3	35.6
Have obtained info about when to grow crops	51.8	70.9	49.8	75.6	33.1	56.9
Have info about water needed by new crops	87.7	93.8	82.8	93.9	83.2	88.2
Seek advice about which crops to grow	38.7	33.9	20.7	30.8	25.9	29.4
Among those who seek advice						
Seek advice on crops (multiple response)						
From farmers	42.5	60.4	40.4	67.5	68.4	56.8
From agricultural cooperative	23.6	17.4	47.2	13.3	6.1	20.5
From agricultural engineer	34.9	15.4	24.7	11.7	11.2	19.0
Water						
Have obtained info about irrigating crops	47.8	70.9	49.3	75.8	34.1	56.5
Have obtained info about quantity of water	40.5	50.0	41.4	72.2	31.0	47.5
Have obtained info about *mesqa* maintenance	24.2	10.0	14.0	15.8	15.6	15.2
Seek assistance with irrigation problem: (multiple responses possible)						
From irrigation engineer	67.9	44.1	64.8	67.6	59.0	59.9
From agricultural cooperative	23.4	25.7	30.1	22.1	17.5	24.0
From other farmers	5.8	20.2	13.5	5.4	6.6	10.9
Prices						
Have info needed to estimate crop price	69.3	58.6	68.5	66.8	60.1	64.3
Among those who have price information						
Obtain information on prices: (multiple responses possible)						
From merchants	93.2	69.0	78.9	41.5	58.1	67.3
From agricultural cooperative	15.3	32.2	41.2	13.1	8.4	23.3
From personal experience	1.0	8.1	13.6	55.8	31.7	22.9
From other farmers	14.7	14.0	18.4	10.0	12.8	14.1
Total	274	440	429	389	378	1910



Chapter 10

Conclusion and Recommendations

10.1 Conclusion

The Ministry of Public Works and Water Resources is facing a water management challenge: a rapidly increasing demand for water and a fixed supply of water. Using irrigation water more efficiently is crucial to meeting this challenge. In the new climate of privatization in Egypt, the Ministry seeks to provide farmers with the information they need to help them make better decisions about their water use and to give them a bigger role in water management.

This report meets the survey objectives in the following ways:

- Provides information to help GreenCOM/WCU design appropriate communication interventions. First, it answers the research questions in Chapter I: Background and provides a complete picture of farmers' knowledge, attitudes and practices about irrigation (summarized under Implications for Programs). Second, the report identifies specific program recommendations for the intervention concerning the target audience, message design, appropriate communication channels and materials design (summarized under Recommendations).

- Identifies 28 baseline indicators that cover knowledge, attitudes, communication and practice (listed at the front of the report).

- Provides information that may be useful to decision makers in policy formulation. Implications for policy are summarised below (Implications for Policy).

Implications for Programs

1. Farmers are not very knowledgeable about the national water situation. While most are aware that the Nile is the main source of water and that agriculture consumes the most water, substantial proportions are not aware of the large number of countries drawing water from the Nile, not aware of the large agricultural projects which will need water, not aware of the fact that Egypt's quota of water from the Nile is fixed and that these facts predispose Egypt to a water shortage.

2. The findings suggest that farmers are not currently disposed to use less water in agriculture. On the contrary, their main preoccupation is how to obtain more water.

3. The report provides data on how farmers are irrigating their crops – the number of times each crop is irrigated and what method and tools are used. Diesel pump is the main irrigation tool throughout the country. Rice is irrigated 32 times by flood, sugar cane is irrigated 9 times mainly by flood, cotton is irrigated 7 times mainly by furrow, wheat is irrigated 5 times by flood, maize is irrigated 7 times mainly by furrow, and clover is irrigated 7 times by flood.

4. The report presents several findings about practices which the Ministry may review to identify opportunities to improve on-farm water management. Not one farmer interviewed is using a modern irrigation method, such as PVC pipe, sprinkler or drip irrigation. Night irrigation is relatively common on a national level: 48 percent of summer irrigations and 26 percent of winter irrigations are performed at night. There may be an opportunity for improvements in land leveling: only 2 percent level by laser, while 16 percent do at least some of their leveling by hand. The cropping pattern may be difficult to change, due to differences in the soil in different regions and other factors. While the report does identify water pollution as a cause of blockages in the system, it may be difficult to resolve these problems without intensive coordination with other ministries to develop alternative methods of waste disposal.

5. The major problems in the system seem to be at the canal level, rather than the *mesqa* level. This point is discussed in more detail below.

6. Female farmers tend to be widows (71 percent), living in smaller, poorer households than male farmers. They cultivate and own smaller areas of land than male farmers: the mean cultivated area is 1.3 feddans for females and 3.2 feddans for males, and owned area is 1.2 feddans for females and 2.4 feddans for males. They are slightly less knowledgeable than male farmers about national water issues and policy matters such as the rice policy. On the other hand, similar proportions of male and female rice farmers are able to identify a short duration variety of rice. Their attitudes towards the Ministry and towards the liberalization of agriculture are similar to those of male farmers. Their attitudes to cost recovery and Water User Associations are not as positive as that of male farmers: the first probably due to their lower ability to pay, and the second due to their lower likelihood of joining predominantly male associations.

   Female farmers' irrigation practices do not differ substantially from those of male farmers, in terms of tools, methods, crop selection, pattern of crop cultivation, cost of irrigation or production. Female farmers also reported a pattern of irrigation problems similar to that of male farmers and similar effects of irrigation problems on land productivity.

   However, as an important conclusion for this communication intervention, female farmers are a significantly less accessible target audience than male farmers. They watch significantly less television and prefer different types of television programs, listen to the

radio significantly less (only two female farmers interviewed ever reads a magazine or newspaper) and they do not have the communication with irrigation engineers that their male counterparts have.

7. Many, but not the majority, of farmers' wives do help in agriculture and irrigation (43 percent). While most wives help with cultivation, about a third of wives also help with irrigation. There is a significant regional variation: only 9 percent of wives in Upper Egypt help their husbands in agriculture and irrigation, compared to 47 percent in the other four regions. Wives are surprisingly knowledgeable about irrigation problems, reporting a pattern of problems similar to those reported by their husbands. This suggests that farmers and their wives communicate well with each other about on-farm water problems.

8. While the study does not evaluate the quality of farmers' relations with their irrigation engineers, we are able to get a sense of the role of the irrigation engineer in farmers' lives. The irrigation engineer's advice is currently sought on only one topic: to demand additional water. This suggests that the irrigation engineer himself might not be able to reach many farmers under the current communication pattern.

9. Mass media can make a substantial contribution to the communication intervention by presenting a wide variety of information to a national audience. The survey also suggests that due to the limited number of irrigation engineers in the field and farmers' current communication pattern, it may make sense to work through groups to reach a larger number of farmers with interpersonal interventions. It may also prove cost effective to target communication interventions at the regional level (see below).

Implications for Policy

Regional nature of cropping pattern and regional nature of communication intervention

Agriculture and irrigation are highly regionalized in Egypt. The crops which suit the soil and conditions in Upper Egypt are not necessarily those that suit the Delta. For example, rice is not grown in Upper Egypt and sugar cane is not grown in the Delta.

Since Upper Egypt is the first to receive water from the High Dam and there is little industrial pollution and lower density of agriculture to cause agricultural pollution, there is a big difference in the quantity and type of problems experienced between Upper and Lower Egypt. Summary measurements follow:[1]

- ✓ 8 percent of farmers have enough water in the *mesqa* in the summer in the Delta compared to 33 percent of farmers in Upper Egypt.
- ✓ 6 percent of farmers in the Delta say that water reaches the end of the *mesqa* in the summer compared to 34 percent of farmers in Upper Egypt.
- ✓ 23 percent of farmers in the Delta say that the *mesqa* is often or usually blocked, compared to 13 percent of farmers in Upper Egypt.

[1] Calculated for all farmers, male and female, and not including farmers in Middle Egypt.

- ✓ 47 percent of farmers in the Delta say that water is usually or always in the *mesqa* on schedule compared to 72 percent of farmers in Upper Egypt.
- ✓ Finally, 64 percent of farmers in the Delta say that they lost crops in the year prior to the survey due to lack of water compared to 33 percent in Upper Egypt.

In the Delta, East Delta farmers seem to be experiencing some of the worst problems. There, a quarter of farmers (compared to 14 percent survey-wide) say they have problems with drainage, while more than 7 in 10 farmers (compared to 5 in 10 for survey-wide) lost crops in the year prior to the survey due to lack of water.

➢ An important policy conclusion from this survey is that communication interventions should be regionally targeted.

Differences by position of *mesqa* on canal vs. location of farm on the *mesqa*

The report reviews differences in irrigation problems at three levels – regional, position of *mesqa* on the canal (beginning or end of the canal), and position of the farm on the *mesqa* (beginning, middle or end). The results show a somewhat surprising pattern of problems that are more significant at the canal level than at the *mesqa* level. Differences that are significant by position of mesqa on canal include:

- ✓ Source of irrigation water
- ✓ Enough water in *mesqa* (summer and winter)
- ✓ Water reaches the end of the *mesqa* (summer and winter)
- ✓ Water in canal on schedule
- ✓ Water in *mesqa* on schedule
- ✓ Proportion who lost crops due to lack of water

The only difference that is significant by position of farm on mesqa is quality of canal cleaning.

➢ An important policy conclusion from this report is that Water User Associations should be set up at the branch level as well as at the *mesqa* level, since that is where many of the problems seem to lie.

10.2 Recommendations

Following are recommendations for communication interventions that are drawn from the research findings. They concern the audiences, messages, channels of communication and materials.

Audiences

➢ Since female farmers represent only 4 percent of the farmer population in Egypt and each female farmer cultivates 60 percent less land than her male counterpart, it may be

more cost effective for GreenCOM to focus on modifying irrigation behaviors of male farmers.

- Farmers in the East Delta may need to be targeted for additional information since they report more problems and concerns than farmers in other regions.

Messages

- The Nile is the main source of water in Egypt.
- The GOE is constructing several major irrigation and agricultural projects and there is a plan is in place to provide water to them.
- Ten countries share the water of the Nile and there are many implications for Egyptian farmers.
- The amount of water available is fixed.
- Egypt is unlikely to negotiate a higher quota of water.
- There is a strong possibility of an upcoming water shortage and farmers will need to use water more efficiently.
- The possibility of water scarcity is real.
- WUAs are being established throughout the country to help farmers communicate with the Ministry and resolve problems at the *mesqa* and branch level.
- There are many different ways that farmers can use less water to irrigate.
- Less water is required for night irrigation than for irrigation in the daytime.
- Farmers who level by hand could improve production by leveling by cultivator.
- Rice growing is limited because of its high water consumption.
- Rice is a high water-consumption crop.
- There are new varieties of short duration rice.
- There are advantages to growing short duration rice.
- Efforts to use water more efficiently will help to provide more water.
- WUAs can benefit farmers.

- All farmers are welcome to join Water User Associations, men and women.
- Water User Associations can be a way to ensure that every farmer gets his fair share of water.
- Irrigation engineers have information about how to maintain *mesqas*.

Channels

- 80 percent of male farmers own television, according to television ownership patterns. 76 percent own radios.
- Female farmers watch significantly less television (55 percent) than male farmers (72 percent).
- The proportion of female who listen to the radio (40 percent) is significantly less than the proportion of male farmers (64 percent).
- If print media are used for farmers they must be designed for the non-literate.
- The main group from whom farmers seek information is the agricultural cooperative.
- Consider an agricultural / irrigation news program with "marketplace" topics.

Materials

- Should be designed for low literacy levels, since 7 in 10 male farmers and virtually all female farmers have primary or less education.

APPENDIX A

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Appendix B
Selected Sample of Canals

Upper Egypt:

Directorate	Inspectorate	District	Canal
Assuit	Bahry Assuit	Manflot	El-Westania
			El Atamna Fara 4
			El Hwatka
		El Qoseia	El Saraqna
			Boq
			Balot
Qena	Qanater Esna	Deshna	Abo Manaa
			El Sayad
			Fara Ganabyt El Seka El Hadid
		Nagh Hmady	El Shikh
			El Kom El Ahmar
			Sayalet El Arbain

Middle Egypt:

Directorate	Inspectorate	District	Canal
Fayoum	West Fayoum	Itsa	Fathet El Softa El Gedida
			Fathet Bahr El Nwara
			Fathet Ahmed El Basel
		Qota	Fathet Shalan El Bahrya
			Fathet El Kharaba(Karm)
			Fathet Abaza El Sharkeya
East Menya	Bahry Menya	Matay	Abo Essa
			Abo Haseba
			El Arab El Gedida
		East Samalot	Fara El Dosuk El Gharby
			Fara 3 Sefsafa
			Waslet Fara 4 Sefsafa
West Menya	West El Yosefy	Manshat El Dahab	Rahel
			El Ganabia El Talta
			Serir
		El Edwa	El Hareka
			Kafr Abd El Khalek
			El Helfaya

East Delta:

Directorate	Inspectorate	District	Canal
Sharkia	Bahry Sharkia	Kafr Sakr	Selim Ezat
			Ganabia 1
			El Hagarsa
		El Heseinya	San El Samana
			Sami
			El Gandl El Sofly
East Dakahlia	Bahry Dakahlia	East Manzala	Boten
			El Mawaged
			El Shabol El Kadema
		West Manzala	Anbar
			El Gamalia
			El Tal
Ismailia	Ismailia	El Tal El Kaber	El Gnabia El Owla
			El Gnabia El Tania
			El Gnabia El Tania
		El Tal El Kaber	El Gnabia El Rabaa
			El Gnabia El Rabaa
			El Sandoq

Middle Delta:

Directorate	Inspectorate	District	Canal
Menoufia	Kebly Menoufia	East Ashmon	Ramlat El Angab
			El Ameria
			El Neanaia El Bahria
		Menof	El Neanaia
			El Sangk El Ayser
			Manhr Ghmrin
West Dakahlia	Belkas	El Massara	El Sabaa
			El Bashma
			Bahr El Massra
		Hafer Shehab El Dien	El Neil
			Kom El Tebn
			Ammar

West Delta:

Directorate	Inspectorate	District	Canal
West Behera	Kebly Behera	Kom Hamada&El Tahdy	Abo Deyab El Aala
			El Afndia
			Zarafa
			Gwar Meania
			Safia
			Shabor

Appendix C

Arab Republic of Egypt
Ministry of Public Works and Water Resources

Knowledge, Attitudes and practices of Farmers towards Water Resources 1998

Farmer's Questionnaire

Ministry of Public Works and Water Resources
Knowledge , Attitudes and Practices of Farmers towards Water Resources

Identification

Region:.....

Governorate: ..... Kism/Markaz: ..... Village: .....

Directorate: ..... Inspectorate: ..... District: .....

Mesqa's location : Begining.....1 End.....2

Canal:..... Mesqa: .....

PSU No.: .....

Land's location from the Mesqa: Beginning ....1 Middle. .2 End. 3

Farmer's name: ..... Farmer's no.: .....

Sex: Male .....1 Female.....2

Wife's Sub-sample: Yes.....1 No.....2

Region
Governorate Kism/Markaz Village
Directorate
Mesqa's location
PSU No
Land's location
Farmer's Number
Sex:
Sub-sample

Visits

	١	2	3	Last visit
Date:	.....	.....	.....	Day Month Year
Team:	.....	.....	.....	
Interviewer's name:	.....	.....	.....	
Coordinator's name:	.....	.....	.....	
Result	.....	.....	.....	
Next visit: Date:	.....	.....	.....	Total no. of visits
Time:	.....	.....	.....	

Result's codes:
1 accomplished in the farmer's own farm
2 accomplished in another farm
3 accomplished in the farmer's house
4 accomplished in another house
5 accomplished in another place
6 partly accomplished
7 refused the visit
8 farmer is not available
9 others .....

	Field Editor	Office Editor	Coder	Keyer
Name	_____	_____	_____	_____
Date	/ /1998	/ /1998	/ /1998	/ /1998
Signature	_____	_____	_____	_____

Section 1 : Farmer's Background

No.	Questions & Filters	Coding Categories	Skip to
101	**Record time**	Hour..... ☐☐ Minute..... ☐☐	
102	How old are you?	Age in completed years ..... ☐☐	
103	Had you ever attended school?	Yes ..... 1 No 2	→ 106
104	What is the highest level of school you attended?	Primary..... 1 Preparatory..... 2 Secondary..... 3 Upper intermediate..... 4 University..... 5	
105	What is the highest grade which you successfully completed at this level?	Grade ..... ☐	
106	Do you have any other work beside cultivating the land ?	Yes ..... 1 No 2	→ 109
107	What is the kind of this work? **Record in details** _____ _____	Technicians and assistants to specialists.... 03 clerks and related..... 04 Services and selling shops ..... 05 Hunting and fishing..... 06 Handicraft and related..... 07 Factories' workers..... 08 General workers..... 09 Working in the army..... 00 Other _____ 96 (specify)	
108	On average how many hours in the day do you spend in cultivating the land and how many hours do you spend in other work?	Hrs in cultivating..... ☐☐ Hrs in other work..... ☐☐	
109	What is the number of individuals in your household?	Number..... ☐☐	
110	What is your current marital status?	Single ..... 1 Married ..... 2 Widowed ..... 3 Divorced..... 4	→ 113
111	Do you have any sons or daughters?	Yes ..... 1 No 2	→ 113
112	How many boys and girls under 16 years do you have? **If no record "00"**	No. of boys..... ☐☐ No. of girls..... ☐☐	
113	Do you have any children in your household who attend school?	Yes ..... 1 No 2	→ 115
114	Do the children who attend school bring with them any information or printed stuff about agriculture and irrigation?	Yes ..... 1 No ..... 2 Don't know..... 8	

No.	Questions & Filters	Coding Categories	Skip to
115	In your home, do you have: Electricity? A black and white T.V.? A colored T.V.? A refrigerator? A radio?	Yes No Electricity..... 1 2 A black and white T.V..... 1 2 A colored T.V..... 1 2 A refrigerator..... 1 2 A radio..... 1 2	
116	What is the source of water your family uses for drinking?	**Piped water** Piped water at home..... 11 Public tap..... 12 **Well- water** Well at home/backyard..... 21 Public well..... 22 **Running waer** Nile / canal..... 31 Other _____ 96 (specify)	
117	What kind of toilet do you have at home?	Modern flush toilet..... 11 Traditional with tank flush..... 12 Traditional without bucket flush... 13 Pit toilet/latrine..... 21 No facility..... 31 Other _____ 96 (specify)	
118	Where do you throw the garbage and wastes of your house?	In any empty area ..... A In the street..... B In the mesqua..... C In the canal..... D In the collector ..... E On natural fertilizer..... F Garbage cars..... G Other _____ X (specify)	
119	How many of the following do you own Cows? Buffalo? Sheep & goat? Tractor? Motor ? Cultivator? Interviewer : if he doesn't own any, record "00"	Number Cows..... ☐☐ Buffalo..... ☐☐ Sheep & goat ..... ☐☐ Tractor..... ☐ Motor ..... ☐ Cultivator..... ☐	
120	How long is the distance from your home to irrigation district? How long is the distance from your home to the agricultural engineer's office? How long is the distance form your home to the office of the agricultural co-operative society? How long is the distance from your home to the village bank ? If the distance is less than 1Km. , record "00"	Distance from your home to irrigation District..... ☐☐ Distance to the agricultural engineer's office ..... ☐☐ Distance to the office of the agricultural cooperation..... ☐☐ The distance to the bank in the village ☐☐	
121	Do you have a savings book or any bank account?	Savings book..... A An account..... B No C	

Section 2: Knowledge and Attitudes towards irrigation and water distribution

No.	Questions & Filters	Coding Categories	Skip to
201	What is the area of this land ? **Interviewer: if the visit was accomplished in a land which was not selected in the sample, ask about the land in the sample.**	Feddan Kirat Area ☐☐ ☐☐	
202	Do you own this land, rent it or cultivate it as a partner for part of the crop?	Rented..... A Owned..... B partnership..... C	
203	What is the total area of the land you are cultivating? What is the area of your own land?	Feddan Kirat Cultivated area ☐☐ ☐☐ Owned area ☐☐ ☐☐	
204	Is this land by the mesqa?	Yes ..... 1 No 2	
205	Do you have continuous flow irrigation or is water here supplied on schedule?	Continuous flow irrigation..... 1 Water supplied on schedule..... 2	
206	How many times did you irrigate your land During this winter? How many times by night? During last summer? How many times by night?	**Winter** Total no. of irrigation ☐☐ No. of irrigation by night ☐☐ **Summer** Total no. of irrigation ☐☐ No. of irrigation by night ☐☐	
207	Was this water all from the mesqa or canal (Nile) or do you have any other source(s) of water?	From Mesqa or canal (Nile)..... 1 → 210 Other sources..... 2	
208	what are these sources?	Well/groundwater..... A Drainage ditches..... B Trucked water C	
209	How frequently do you use these sources?	Regularly in both winter & summer..... 1 Regularly in summer only..... 2 Occasionally..... 3 Only in emergencies..... 4	
210	If you had continuous flow and therefore greater control over your water supply, do you think you would use less or more or the same quantity of water?	More ..... 1 Less..... 2 Same quantity 3	

No.	Questions & Filters	Coding Categories	Skip to
211	Does the quantity of water in this Mesqua was enough for irrigation Last this winter? Last summer? Last Nili ?	 Enough..... 1 Was sometimes enough..... 2 Wasn't enough..... 3 Enough..... 1 Was sometimes enough..... 2 Wasn't enough..... 3 Enough..... 1 Was sometimes enough..... 2 Wasn't enough..... 3 No Nili season..... 4	
212	Which irrigation tool do you use? Do you own this tool?	Ownership: Yes / No Sakia..... A 1 2 Tanpor..... B 1 2 Diesel pump..... C 1 2 Electrical pump..... D 1 2 Well pump..... E 1 2 Others _____ X 1 2 (specify)	
213	What methods of on farm irrigation do you use?	Flood method..... A Furrow method..... B PVC pipe..... C Sprinkler..... D Automated sprinkler..... E Drip method..... F Other_____ X (specify)	
214	What is the biggest problem you face while irrigating: Last winter? Last summer? Last Nili ?	Winter / Summer / Nili Shortage of water..... A A A Irregular shifts..... B B B High cost of irrigation C C C Saltiness of water..... D D D Water is cold..... E E E Pump is crowded..... F F F No problem..... G G G Other _____ X X X (specify)	
215	Does the water reaches the end of the Mesqa during shifts? Last winter? Last summer? Last Nili?	Always / Often / Sometimes / No season 1 2 3 4 1 2 3 4 1 2 3 4	

No.	Questions & Filters	Coding Categories	Skip to
216	Concerning the purification, how many times was: the supplementary canal purified? What's your opinion? the misqa purified? What's your opinion? the field collector purified? What's your opinion?	Farmer's opinion No. of purifications / good / moderate / bad Supplementary canal Misqa Field collector	
217	Do the mesqas get usually blocked because of wastes?	No ..... 1 Rarely..... 2 Sometimes..... 3 Often..... 4 Usually..... 5	
218	Do the canals get usually blocked because of wastes ?	No ..... 1 Rarely..... 2 Sometimes..... 3 Often..... 4 Usually..... 5	
219	Is there drainage network in your area?	Yes ..... 1 No 2	→ 227
220	Is the drainage covered or uncovered?	Uncovered ..... 1 Covered ..... 2 Partly covered 3	→ 227
221	Do the collectors get blocked because of the wastes?	No ..... 1 Rarely..... 2 Sometimes..... 3 Often..... 4 Usually..... 5	
222	Is your land located on the collector?	Yes ..... 1 No 2	
223	Do you irrigate from the collector?	Yes ..... 1 No 2	→ 226
224	Is the drainage water fresh all time, sometimes fresh, high saline or polluted with sewage and wastes?	Fresh all time..... A Sometimes fresh..... B High saline..... C Polluted with sewage and industrial waste..... D	
225	What is this drainage waters impact on: Crop yield?	**Crop yield** Decrease quality of crop..... A No effect..... B Other_____ X (specify)	
	Soil fertility?	**Soil fertility** Decrease soil fertility..... A Saltiness of soil..... B No effect..... C Other _____ X (specify)	→ 227
	Health?	**Health** Affects human health..... A Affects livestock health..... B No effect..... C Other _____ X (specify)	

No.	Questions & Filters	Coding Categories	Skip to
226	Why don't you irrigate from collector?	Collector is contaminated with chemicals A Collector is contaminated with sanitary B Collector's water is salty..... C Not available ..... D Others_____ X (specify)	
227	Do you have any problem with disbursing the water?	Yes ..... 1 No 2	
228	Do you make the land even?	Yes ..... 1 No ..... 2 →	233
229	How do you make the land even?	By hand..... A By cultivator..... B By mechanical cultivator..... C By laser..... D Others _____ X (specify)	
230	Could another method improve your land leveling and therefore productivity?	Yes ..... 1 No ..... 2 →	233
231	Which method?	Cultivator..... A Mechanical cultivator..... B Laser ..... C Others _____ X (specify)	
232	Why do you not use it already?	Equipment not available..... A Too costly..... B Too few feddans..... C Removes top soil..... D Other_____ X (specify)	
233	In the last year have you lost crops to lack of water?	Yes ..... 1 No 2	
234	In the last year have you left any of your lands uncultivated/fallow due to an inadequate water supply?	Yes ..... 1 No ..... 2 →	237
235	Was this in summer only or in the whole year?	Summer only..... 1 Whole year 2	
236	What area did you leave uncultivated?	Feddan Kirat Area ☐☐ ☐☐	
237	Do you think any irrigation improvements could increase productivity of your land?	Yes ..... 1 No ..... 2 →	240
238	Name the most three items that would improve irrigation?	Continuos purifying of the canal..... A Covering sides of the canal..... B Cover the canal..... C Regular shifts..... D Using drainage water for irrigation after treatment..... E Expanding draining network..... F Decreasing saltiness of water..... G Other _____ X (specify)	

No.	Questions & Filters	Coding Categories		Skip to
239	Who can/should undertake these improvements?	Myself.....	A	
		Farmers working together.....	B	
		WUA.....	C	
		Village/ local authorities.....	D	
		Bahara.....	E	
		District irrigation engineer.....	F	
		Other _____ (specify)	X	
240	Do you have any idea to lessen the quantity of water used for irrigation?	Yes	1	
		No	2	→ 242
241	How?	Irrigation by night.....	A	
		Cleaning interior mesqa.....	B	
		Spray or drop irrigation	C	
		Irrigation part by part.....	D	
		Cultivating on furrow.....	E	
		Other _____ (specify)	X	
242	What are the advantages of irrigation by night?	The required water by night is less..	A	
		Doesn't cause problem with other farmers.....	B	
		Decrease of evaporation and transpiration for the benefit of the crop..	C	
		Land is cold by night /plants don't fall down.....	D	
		No advantages to be mentioned	E	
		Others _____ (specify)	X	
243	What are the problems of irrigation by night?	Can't sleep well.....	A	
		Inability to see water while irrigating by night.....	B	
		Ability of stealing water by other farmers	C	
		Fear of monsters and thieves.....	D	
		Humidity	E	
		Deficiency of working hands.....	F	
		No problems.....	G	
		Other_____ (specify)	X	

Section 3: Selection of crops

No.	Questions & Filters	Coding Categories	Skip to
301	Now, I want to ask you about the crops which you have cultivated **in this land** last summer and last winter. What are the most three important crops you have cultivated		

	Summer crops			Winter crops		
Crop's name	.....	.....	.....	.....	.....	.....
Crop's code	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
The area	Feddan Kirat ☐☐ ☐☐	Feddan Kirat ☐☐ ☐☐	Feddan Kirat ☐☐ ☐☐	Feddan Kirat ☐☐ ☐☐	Feddan Kirat ☐☐ ☐☐	Feddan Kirat ☐☐ ☐☐
Why did you cultivate (crop)						
For market.....A	A	A	A	A	A	A
For house.....B	B	B	B	B	B	B
For livestock.....C	C	C	C	C	C	C
Others_____X	X	X	X	X	X	X
How many times did you irrigate the (crop).....	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
Which tool do you use for the majority of the (crop)?	.....	.....	.....	.....	.....	.....
Which irrigation method did you use?	☐	☐	☐	☐	☐	☐
How much does irrigation of (crop) costs you in total?	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐
How much does the feddan produce.....	☐☐☐☐ ☐☐	☐☐☐☐ ☐☐	☐☐☐☐ ☐☐	☐☐☐☐ ☐☐	☐☐☐☐ ☐☐	☐☐☐☐ ☐☐

302	What are the factors that you take into consideration while choosing the crops?	Soil condition..... A Market price..... B Quantity of water..... C Expenses of agricultural factors D Availability of agricultural factors E Crop rotation..... F Household usage .... G Level of effort..... H According to neighbour's cultivation..... I According to size of land..... J Feeding livestock..... K Other _____ X (specify)		
303	If a continuos and adequate quantity of water was available for you, which crop would you cultivate?	Same crops..... 1 Other crops _____ 6 (specify)		
304	Do you ask for anyone's advice while choosing the crops?	Yes ..... 1 No 2	→	306
305	Whose opinion do you ask for?	Agricultural engineer..... A Irrigation engineer..... B Agricultural co op..... C Mass media..... D Other farmers..... E Wife..... F Children..... G Parents/relatives..... H Others_____ X (specify)		

No.	Questions & Filters	Coding Categories		Skip to
306	What are the crops that require more water?	Rice Sugar cane Clover Maize Wheat Potatoes Cotton Others _____ (specify)	A B C D E F G X	
307	How much do you think that it's important to take the cost of irrigation into consideration while choosing the crops?	Very important Important Not that much Not important Not important at all	5 4 3 2 1	
308	Check 301: There is no rice ☐	There is rice ☐		→ 311
309	Do you ever grow rice?	Yes No	1 2	→ 311
310	Why not?	Land is not suited for rice Get more income from other crops Government restrictions Water shortage Neighbour doesn't cultivate Small area No collectors Other _____ (specify)	A B C D E F G X	→ 323
311	Why do you choose to grow rice over other possible summer crops?	Get more income Provides family food Is easier to grow Is a more certain crop yield Provides important byproducts. Farmers around me grow rice No government intervention or controls on buying inputs or selling output Suits the land Decreases saltiness of land Cultivation rotation Other _____ (specify)	A B C D E F G H I J X	
312	Which kind of rice do you cultivate?	Philippines Giza 178 Giza 4000 Other _____ (specify)	1 2 3 6	
313	Do you cultivate this kind with direct (bader) or with (El shalta)?	El Bader El Shalta	1 2	

No.	Questions & Filters	Coding Categories	Skip to
314	Why?	Consumes less water..... A Increase production..... B Takes less time in the land..... C Endures saltiness of land..... D It is cultivated by this method E Other _____ X (specify)	
315	There is a certain kind of rice, which remains for a shorter time in the soil and gives more quantity than the normal rice, have you ever heard of this kind? If yes : what is it's name?	Yes ..... 1 Name : _____ ☐ No 2	→ 320
316	Have you ever cultivated this kind?	Yes ..... 1 No 2	→ 318
317	Why did you cultivate it?	Consumes less water..... A Less time..... B Better crop yield..... C Endures saltiness of water..... D The only kind in the Co op..... E Other _____ X (specify)	→ 320
318	Why didn't you cultivate it?	..... ☐☐	
319	What would encourage you to cultivate it?	..... ☐☐	
320	I f you could not grow rice in the summer as a part of your rotation, what would be your choice of a crop to replace it ?	Cotton..... 1 Maize..... 2 Other_____ 6 (specify)	
321	Are you allowed to cultivate rice?	Yes ..... 1 No 2	→ 323
322	Does the fine would prevent you from cultivating it?	Yes ..... 1 No 2	
323	Do you know why the ministry determine the area that should be cultivated with rice?	Yes ..... 1 No 2	→ 325
324	Why?	Needs a lot of water..... A Increase the underground water in the soil..... B Decreases water salinity C Others_____ X (specify)	
325	Check 301: There is no sugar cane ☐	There is sugar cane ☐ →	332
326	Have you ever cultivated sugar cane?	Yes ..... 1 No 2	→ 332
327	Why didn't you cultivate it before?	It takes a long time..... A Forbidden to cultivate it..... B Deficiency of water..... C Land is unsuitable..... D Less income..... E Small land..... F Don't know how to cultivate it G Other_____ X (specify)	
328	Have you ever cultivated sugar beet before?	Yes ..... 1 No 2	→ 330

No.	Questions & Filters	Coding Categories		Skip to
329	Why didn't you cultivate the sugar beet?	Prefers other crops.....	A	
		Relatives/neighbours don't cultivate it.....	B	
		Land is unsuitable.....	C	401
		Don't know how to cultivate it...	D	
		Other_____ (specify)	X	
330	Why did you cultivate it?	High income.....	A	
		Suitable land.....	B	
		Don't need a lot of water.....	C	
		Cultivation rotation.....	D	
		Other_____ (specify)	X	
331	What did you cultivate after harvesting the sugar beet?	Rice.....	1	
		Cotton.....	2	
		Other _____ (specify)	6	401
332	Why do you cultivate sugar cane?	High income.....	A	
		Takes less effort.....	B	
		Certain crop yield.....	C	
		Certainity of marketing.....	D	
		Suitable for land.....	E	
		Neighbours cultivate it.....	F	
		Government decision.....	G	
		Other _____ (specify)	X	
333	Can you cultivate sugar beet instead of sugar cane?	Yes	1	
		No	2	
334	Why?	Don't know anything about it...	A	401
		Don't have any experience in marketing.....	B	
		High price.....	C	
		Don't know how to cultivate it	D	
		Land unsuitable.....	E	
		Region unsuitable.....	F	
		Other _____ (specify)	X	
335	Is the profit from sugar beet more, less or the same as sugar?	Same profit	1	
		More profit.....	2	
		Less profit.....	3	
		Don't know.....	8	
336	Does the sugar beet needs more or less or the same quantity of water as sugar cane?	Same quantity.....	1	
		More quantity.....	2	
		Less quantity.....	3	
		Don't know.....	8	

Section 4:Wife's (Husband's) role

No.	Questions & Filters	Coding Categories	Skip to
401	Check 110 Married ☐ ↓	Others ☐ →	501
402	Does your wife (husband) help you in cultivation and irrigation?	Yes..... 1 No..... 2 →	405
403	What specifically does she(he) do?	Help in irrigation..... A Help in agriculture..... B Help in rearing livestock..... C Supervising workers..... D Other _____ X (specify)	
404	Approximately how many hours she (he) help you in the week?	Hours _____ ☐☐	
405	Do you think that your wife (husband) have information about cultivation & irrigation?	Yes..... 1 No..... 2	
406	Do you discuss with your wife (husband) about cultivation and irrigation ?	Yes..... 1 No..... 2	
407	Do you discuss the finances of cultivation with your wife (husband)?	Yes..... 1 No..... 2 →	409
408	Do you seek her (his) advice about agricultural – related expenses?	Yes..... 1 No..... 2	
409	Does your wife (husband) have knowledge regarding the marketing for various crops?	Yes..... 1 No..... 2	
410	If your wife (husband) suggests something about crop selection, cultivation or irrigation. Do you act upon, considering or disregarding her opinion?	Act upon..... 1 Considering..... 2 Disregarding 3	

Section 5: LIBERIZATION

No.	Questions & Filters	Coding Categories		Skip to
501	Since five years ago the government has no longer determined the crops rotation and prices and also reduced subsidized inputs. Have all these facts changed what you cultivate by other crops?	Yes No	1 2	→ 504
502	What is the most important crop which you changed?	_____	☐☐	
503	Why did you change (crop)?	Low income Affects the land Small land Increases cultivation expenses Deficiency in laborers Long period Neighbour don't cultivate Other _____ (specify)	A B C D E F G X	→ 505
504	Why didn't you change?	Crop is suitable for land Land doesn't allow cultivation of other crops High income Cultivation rotation Needs of household and livestock Small land Don't know how to cultivate other crops Other _____ (specify)	A B C D E F G X	
505	Have these factors combined with the new tenent law brought about changes in who is working the land and who is making the major decisions regarding crop selection, cultivation and irrigation on this property?	Yes No	1 2	
506	Do you welcome these changes or do you feel the risks are too great?	Welcome the changes Don't welcome these changes Risks are too great Don't know	1 2 3 8	
507	Have your profit margin stayed the same, increased or decreased after all these changes?	Increased The same Decreased	1 2 3	→ 509
508	Do you think you will be able to increase profits with time as you learn to adjust to the changes?	Yes No	1 2	
509	Do you think you could increase your profits by growing more fruits and vegetables?	Yes No	1 2	
510	Why ?	Marketing is suitable Improving the crop Climate Land don't allow Deficiency of laborers Bad production Big effort High expenses Market is not good in the region Small area Needs fresh water Parasites Other _____ (specify)	A B C D E F G H I J K L X	
511	Have you access to the information you need to make good predictions regarding the market price at harvest time?	Yes No	1 2	→ 513
512	Where do you get this information?	Television Farmers Merchants Agricultural co op Relatives/ neighbour Personal experience Advisory manuals Other _____ (specify)	A B C D E F G X	→ 514

No.	Questions & Filters	Coding Categories		Skip to
513	How could you get this information?	Television Farmers Merchants Agricultural co op Relatives/ neighbour Advisory manuals Don't know Other _____ (specify)	A B C D E F Z X	
514	Do you have the information you need to make good choices as to the new crops to try?	Yes No	1 2	→ 517
515	Do you have the information you need to make good predictions about the water requirements for new crops you cultivate?	Yes No	1 2	→ 517
516	Where do you get this information?	Television Farmers Merchants Agricultural co op Relatives/ neighbour Personal experience Advisory manuals Other _____ (specify)	A B C D E F G X	→ 601
517	How could you get this information?	Television Farmers Merchants Agricultural co op Relatives/ neighbour Advisory manuals Don't know Other _____ (specify)	A B C D E F Z X	

Section 6: Ministry's policy

No.	Questions & Filters	Coding Categories		Skip to
601	Are you aware of any repair or maintenance of the distributor canal that would improve water delivery to your mesqa?	Yes.....	1	
		No.....	2	→ 603
602	What can be done?	Purify canal.....	A	
		Informing farmers not to throw garbage	B	
		Expanding canals.....	C	
		Expanding drainage.....	D	
		Increase water.....	E	
		Cover canal	F	
		Other_____ (specify)	X	
603	Does the water run in the distributory canal in shifts?	Always	1	→ 606
		Usually.....	2	
		Sometimes.....	3	
		Infrequently.....	4	
		Never.....	5	
604	What is the major cause of this obstruction?	Deficiency of water.....	A	
		Unpurified	B	
		Throwing garbage.....	C	
		Weeds/water plants.....	D	
		Dead animals.....	E	
		Other_____ (specify)	X	
605	Could this problem be solved by more frequent dredging?	Yes.....	1	
		No.....	2	
606	Does the water run in the mesqa in the shifts?	Always	1	→ 608
		Usually.....	2	
		Sometimes.....	3	
		Infrequently.....	4	
		Never.....	5	
607	What is the major cause of this obstruction?	Deficiency of water.....	A	
		Unpurify.....	B	
		Trash, solid waste.....	C	
		Weeds/ water plants.....	D	
		Dead animals	E	
		Other _____ (specify)	X	
608	In your opinion what is the quality of the water in the mesqa?	Pure.....	1	→ 610
		Polluted.....	2	
609	What are the major causes of this pollution?	Bacteria (bilharzia & e-coli).....	A	
		Pesticide & fertilizer residue.....	B	
		Household waste water, soap residue...	C	
		Industrial waste.....	D	
		Sewage.....	E	
		Dead animals.....	F	
		Drainge water	G	
		Other._____ (specify)	X	
610	How could we protect the Mesqa from this pollution?	sanitary.....	A	
		Purification.....	B	
		Fine for throwing garbage/dead animals	C	
		Cover mesqa.....	D	
		Cleaning canal.....	E	
		Other_____ (specify)	X	
611	How frequently is the mesqa cleaned?	Monthly.....	1	
		Every 3 months.....	2	
		Every 6 months.....	3	
		Every year.....	4	
		Other_____ (specify)	6	

No.	Questions & Filters	Coding Categories	Skip to
612	Who is responsible for cleaning this mesqa?	Irrigation engineer..... A Agricultural engineer..... B Agricultural co op..... C Farmers..... D Others_____ X (specify)	
613	If the mesqa was continually cleaned would this increase available water to your land and therefore increase the productivity of your land?	Yes..... 1 No..... 2	
614	Is the water in the mesqa fresh or saline?	Fresh ..... 1 Saline 2	
615	If irrigation waters are polluted does this reduce the overall quantity of water available for cultivation?	Yes..... 1 No..... 2	
616	Have you heard of Society of Water Consumers?	Yes..... 1 No..... 2 → 621	
617	Are you a member of a Society of Water Consumers?	Yes ..... 1 No ..... 2 → 621	
618	What is this society called?	Name _____ ☐	
619	As a member of the society do you participate in : Planning irrigation improvements with the district engineer Setting regulations for the society Electing representatives Solving conflicts between farmers Sharing in the costs of mesqa repair and maintenance	yes No Planning irrigation improvements with the district engineer..... 1 2 Setting regulations for the society... 1 2 Electing representatives..... 1 2 Solving conflicts between farmers... 1 2 Sharing in the costs of mesqa repair and maintenance..... 1 2	
620	Is this society successful in meeting your needs?	Yes ..... 1 No ..... 2 → 626	
621	Societies of Water Consumers do exist in some areas of the country and they function as follows: farmers on one mesqa select a leader/ representative to the society which meets regularly with the district irrigation engineer to determine the major repairs that need to be made. The society is also responsible to organize regular mesqa maintenance and resolve conflicts. Do you think you could benefit from participating in such an organization?	Yes..... 1 No..... 2	
622	If a society of Water Users was formed in your area, would you join it?	Yes ..... 1 No ..... 2 → 625	
623	Why?	Benefit of farmer/farmers..... A Benefit of land..... B Caring for mesqa..... C Solving water problems..... D Getting information about irrigation.. E Complains reach responsible people.. F Other_____ X (specify)	
624	If you were a member of the society would you participate in : Planning irrigation improvements with the district engineer Setting regulations for the society Electing representatives Solving conflicts between farmers Sharing in the costs of mesqa repair and maintenance	yes No Planning irrigation improvements with the district engineer..... 1 2 Setting regulations for the society... 1 2 Electing representatives..... 1 2 Solving conflicts between farmers... 1 2 Sharing in the costs of mesqa repair and maintenance..... 1 2	→ 626

No.	Questions & Filters	Coding Categories	Skip to
625	Why not?	No benefits from society A Farmer is not responsible B Lot of problems C Old age D Other_____ X (specify) Don't know Z	
626	Are you a participant in an agricultural co-op society?	Yes ..... 1 No 2	→ 628
627	What is the most important reason for your participation?	Getting seeds..... A Getting fertilizers (cheap price)..... B Getting fertilizer (on account)..... C Taking crop yield..... D Bank loans..... E Agricultural advisor..... F Inherited from relatives..... G Other_____ X (specify)	→ 629
628	What is the most reason for your non-participation?	No time A Small land B Other responsibilities C Have no hiaza D Other_____ X (specify)	

In your community now

629 Are there any penalties against the farmer	630 What are those penalties?	631 Who is responsible of enforcing these penalties?
if he didn't share in costs of purification of the Mesqa? yes.....1 → no.....2 ↓	Money.....1 Work .....2 Other_____6 (specify)	Mesqa users..... A Meyer..... B Sheikh el balad..... C Agricultural society..... D Police ..... E Local council.....F Other_____X (specify)
If the tractor broke the bridge of the Mesqa yes.....1 → no.....2 ↓	Money.....1 Work .....2 Other_____6 (specify)	Mesqa users..... A Meyer..... B Sheikh el balad..... C Agricultural society..... D Police ..... E Local council.....F Other_____X (specify)
If the farmer took quantity of water more than his share yes.....1 → no.....2 ↓	Money.....1 Other_____6 (specify)	Mesqa users..... A Meyer..... B Sheikh el balad..... C Agricultural society..... D Police ..... E Local council.....F Other_____X (specify)
If the farmer broke a passing bridge on intention to sink the crop of another farmer → yes.....1 no.....2 ↓	Money.....1 Other_____6 (specify)	Mesqa users..... A Meyer..... B Sheikh el balad..... C Agricultural society..... D Police ..... E Local council.....F Other_____X (specify)

632	Do you know the name of your irrigation engineer? If yes what is his name?	Yes ..... 1 Name _____ ☐ No 2	
633	Have you ever met the irrigation engineer last year ?	Yes ..... 1 No 2	→ 638

No.	Questions & Filters	Coding Categories	Skip to
634	How many times did you visit your irrigation engineer Last summer? Last winter?	Last summer..... ☐☐ Last winter..... ☐☐	
635	Why have you visited the district irrigation engineer?	Purify the canal..... A Deficiency of water..... B Other_____ X (specify)	
636	Did the district irrigation engineer respond to your need/questions?	Yes ..... 1 No 2	
637	Where is the best place to meet the district irrigation engineer?	Irrigation engineering..... 1 Social co op..... 2 Field..... 3 Other_____ 6 (specify)	
638	What is the shifts- schedule of this Mesqa Last winter? Last summer?	Last winter_____ ☐ Last summer_____ ☐	
639	Are the shifts arranged regularly?	Always ..... 1 Often..... 2 Sometimes..... 3 No 4	
640	Has the shifts schedule proved to be as regular as last year, more regular or less regular?	As last year..... 1 More regular..... 2 Less regular..... 3	
641	If you have a problem with your irrigation water, who can help you?	Irrigation engineer..... A Agriculture co op ..... B Other governmental district..... C Farmers..... D Relatives/friends..... E WUA..... F Other_____ X (specify)	
642	Have you received any information or advice about: How to develop the working operations, maintenance of the mesqa and collector? If yes, what is the source of information?	Yes.....1 source ..... ☐ No 2	
	The appropriate time for cultivating each crop? If yes, what is the source of information?	Yes.....1 source ..... ☐ No.....2	
	How to irrigate the crops? If yes, what is the source of information?	Yes.....1 source ..... ☐ No.....2	
	Quantity of water used for each irrigation? If yes, what is the source of information?	Yes.....1 source ..... ☐ No.....2	
	Adding new crops? If yes, what is the source of information?	Yes.....1 source ..... ☐ No 2	

No.	Questions & Filters	Coding Categories	Skip to
643	Do you know Bahara? If yes , what 's his name?	Yes ..... 1 Name _____ ☐ No 2	
	Worker of the agricultural instructions? If yes , what 's his name?	Yes ..... 1 Name _____ ☐ No 2	
	Manager of the bank in the village? If yes , what 's his name?	Yes ..... 1 Name _____ ☐ No 2	
	Manager of the agricultural Co-operative society? If yes , what 's his name?	Yes ..... 1 Name _____ ☐ No 2	
	Engineer of agricultural instructions? If yes , what 's his name?	Yes ..... 1 Name _____ ☐ No 2	▶645
644	What are the most important information that you know from the agricultural advisor/engineer?	Treating parasites and diseases..... A Information about new crops..... B Information about seeds..... C Other _____ X (specify)	
645	If you had the opportunity to speak with someone responsible in the MPWWR, what would be the most important point you would like to make?	Increase quantity of water..... A Purifying canal..... B Regular shifts..... C Other_____ X (specify)	
646	Are you willing to share in :	Yes No	
	The cost of upgrading the irrigation system to provide continuous water flow?	1 2	
	The cost of upgrading the drainage system	1 2	

Section 7: Water's situation in Egypt

No.	Questions & Filters	Coding Categories		Skip to
701	What is the main source of water in Egypt?	The Nile	1	
		Another answer	2	→ 705
702	How many country (including Egypt) share the Nile's water?	No.	☐☐	
		Don't know	98	
703	Do you think that Egypt has a constant quantity of the Nile's water or changeable quantity from one year to another?	Constant quantity	1	
		Changeable quantity	2	
		Others _____ (specify)	6	
		Don't know	8	
704	Do you think that Egypt can agree with the other countries sharing with her the Nile's water to increase Egypt's quota in the water ?	Yes	1	
		No	2	
		Don't know	8	
705	In your opinion which sector uses the greatest quantity of water dwellers, industry or agriculture?	Dwellers	1	
		Industry	2	
		Agriculture	3	
		Don't know	8	
706	To what extent do you think Egypt have a water shortage now?	Serious degree	1	
		Not serious degree	2	
		No problem	3	
		Don't know	8	
707	How likely do you think that Egypt could suffer from lack of water in the future?	Serious degree	1	→ 709
		Not serious degree	2	→ 709
		No problem	3	
		Don't know	8	→ 710
708	What are the main reasons that would prevent Egypt from facing such problem?	Availability of enough water	A	→ 710
		Solution from God	B	→ 710
		Irrigation development	C	→ 710
		Others _____ (specify)	X	→ 710
		Don't know	Z	→ 710
709	What are the main reasons that would lead to water scarity in Egypt?	Over population	A	
		Cultivation needs more water	B	
		Manufacture needs more water	C	
		New projects	D	
		Conflicts on Nile	E	
		New dwelling regions	F	
		Others _____ (specify)	X	
		Don't know	Z	
710	Can you name the largest agricultural development projects in the country?	Tushka project	A	
		El salam canal	B	
		Other _____ (specify)	X	
		Don't know	Z	→ 713
711	Do you think that these projects are necessary for Egypt's development?	Yes	1	
		No	2	
		Don't know	8	
712	Do you think that the current water supply for the country will be adequate for these new projects?	Yes	1	
		No	2	
		Don't know	8	

No.	Questions & Filters	Coding Categories		Skip to
713	When you think of the future, what is greatest concern regarding water for irrigation?	Don't reach water.....	A	
		Saltiness of irrigation water.....	B	
		Decline of level of water in high dam	C	
		Cleanliness and availability of water	D	
		Consuming drainage water.....	E	
		Covering canal.....	F	
		Costs of irrigation water.....	G	
		Draught in the future.....	H	
		Other_____ (specify)	X	
714	Is the MPWWR's task of bringing water to farmers simple or difficult?	Simple.....	1	
		Usually simple/occassionally difficult..	2	
		Difficult and complex.....	3	
		Extremely difficult and complex.....	4	
		Impossible to meet all needs.....	5	
715	Do you think that the MPWWR's could do a better job of wate delivery?	Yes	1	
		No	2	→ 801
716	How?	Continuous purification.....	A	
		Good follow-up.....	B	
		Increasing no. of canals.....	C	
		Using drainage water in irrigation...	D	
		Increase time of shifts.....	E	
		Using new methods for irrigation.....	F	
		Covering canals.....	G	
		Other_____ (specify)	X	

Section 8 : Exposure to Mass Media

No.	Questions & Filters	Coding Categories		Skip to
801	Do you watch T.V.?	Yes	1	
		No	2	→ 812
802	For how many hours on average do you watch T.V. every day? **If less than one hr, record "zero zero"**	Hours	☐☐	
803	At what time during the day, do you watch T.V.?	Morning.....	A	
		Noon.....	B	
		Afternoon.....	C	
		Evening	D	
		Occasionally.....	E	
804	Which channels do you prefer?	First.....	A	
		Second.....	B	
		Third.....	C	
		Fourth.....	D	
		Fifth.....	E	
		Sixth.....	F	
		Seventh.....	G	
		Eighth.....	H	
805	Which are the most preferable programs for you ?	Religious programs.....	A	
		Political programs.....	B	
		Cultural programs.....	C	
		Sports.....	D	
		Entertainment.....	E	
		Agricultural	F	
		Other _____ (specify)	X	
806	Do you watch any program that deals with agriculture?	Yes	1	
		No	2	→ 808
807	What are those programs?	Ser el ard.....	A	
		Kher baladna.....	B	
		Good morning Egypt.....	C	
		Ads.....	D	
		Other_____ (specify)	X	
808	Have you ever watched any program discussing the preservation of water for irrigation on T.V.?	Yes	1	
		No	2	→ 810
809	What did you see?	Ser el ard.....	A	
		Informing ads.....	B	
		Polluted water from sanitary and industrial garbage.....	C	
		Other _____ (specify)	X	
810	Have you ever watched any program discussing the contamination of water for irrigation on T.V.?	Yes	1	
		No	2	→ 812
811	What did you see?	Ser el ard.....	A	
		Attitudes.....	B	
		Belharizia.....	C	
		Pollution ads.....	D	
		Other_____ (specify)	X	
812	Do you listen to the radio?	Yes	1	
		No	2	→ 820

No.	Questions & Filters	Coding Categories	Skip to
813	For how many hours on average do you listen to the radio every day? **If less than one hr, record "zero zero"**	No of hrs..... ☐☐	
814	At what time during the day do you usually listen to the radio?	Morning..... A Noon..... B Afternoon..... C Evening ..... D Occasionally ..... E	
815	Which are the most three preferable programs for you ?	Religious programs..... A Political programs..... B Cultural programs..... C Sports..... D Entertainment..... E Agricultural ..... F Other _____ X (specify)	
816	Do you listen to any program dealing with agriculture?	Yes ..... 1 No 2	→ 818
817	Which are these programs?	Agricultural information..... A Ads..... B Other_____ X (specify)	
818	Have you ever listened to any program discussing the preservation of water for irrigation in the radio?	Yes ..... 1 No 2	
819	Have you ever listened to any program discussing the contamination of water for irrigation in the radio?	Yes ..... 1 No 2	
820	In the last six months have you seen any other entertainment at any other place?	Yes..... .... 1 No..... 2	→ 822
821	What have you seen?	Drama troupe..... A Story teller..... B Local cinema..... C Videos programs..... D Mobile videos..... E Other_____ X (specify)	
822	How often do you read a newspaper or a magazine	Daily..... 1 Weekly..... 2 Every 2 weeks..... 3 Monthly..... 4 Don't read..... 5 Can't read..... 6	→ 829
823	Which newspapers and magazines do you read?	Al akhbar..... A El ahram..... B El ghomhoria..... C El mesa..... D Parties newspapers..... E Local newspapers..... F Other_____ X (specify)	
824	Have you find any issues concerning agriculture and irrigation?	Yes ..... 1 No 2	

No.	Questions & Filters	Coding Categories		Skip to
825	Have you ever read any issue about preservation of water for irrigation?	Yes	1	
		No	2 →	827
826	What did you read?	New projects.....	A	
		Crops.....	B	
		Preserving irrigation water.....	C	
		Irrigation methods.....	D	
		Other_____	X	
		(specify)		
827	Have you ever read any issue about contamination of water for irrigation?	Yes	1	
		No	2 →	829
828	What did you read?	Water pollution.....	A	
		Industrial wastes.....	B	
		Preserving water.....	C	
		Claning nile water.....	D	
		Other _____	X	
		(specify)		
829	From where did you obtain the most useful information about agriculture?	Irrigation engineer	A	
		Employee/agricultural society.....	B	
		Neighbours and relatives.....	C	
		Television and radio	D	
		Farmers.....	E	
		Bahar.....	F	
		Other_____	X	
		(specify)		
830	Do you attend any local meetings?	Yes	1	
		No	2 →	834
831	What kind of meetings do you attend?	Religious.....	A	
		Population.....	B	
		Agricultural.....	C	
		Village development.....	D	
		Agricultural co op society.....	E	
		Other_____	X	
		(specify)		
832	How frequently do you attend these meetings?	Weekly.....	1	
		Monthly.....	2	
		Every 6 months.....	3	
		Yearly.....	4	
		Other_____	6	
		(specify)		
833	Where do you attend these meetings?	Mosque.....	A	
		Agricultural co op society.....	B	
		Local council.....	C	
		Youth center.....	D	
		Other_____	X	
		(specify)		
834	Record time	Hour.....		
		Minute.....		

Arab Republic of Egypt
Ministry of Public Works and Water Resources

Knowledge, Attitudes and practices of Farmers towards Water Resources 1998

Farmer's wife Questionnaire

Ministry of Public Works and Water Resources
Knowledge , Attitudes and Practices of Farmers towards Water Consumption and Corps Selection

Identification

Region:.....

Governorate: ..... Kism/Markaz: ..... Village: .....

Directorate: ..... Inspectorate: ..... District: .....

Canal:..... Mesqa: .....

PSU No.: .....

Farmer's name: ..... Farmer's no.: .....

Wife's name: ..... Wife's no.: .....

Region ☐
Governorate ☐☐ Kism/Markaz ☐☐ Village ☐☐☐
Directorate ☐☐
PSU No. ☐☐☐☐☐
Farme's No. ☐☐☐
Wife's No. ☐☐

Visits

	1	2	3	Last visit
Date:	.....	.....	.....	Day ☐☐ Month ☐☐ Year ☐☐
Team:	.....	.....	.....	☐☐
Interviewer's name:	.....	.....	.....	☐☐
Supervisors name:	.....	.....	.....	☐☐
Result	.....	.....	.....	☐
Next visit: Date:	.....	.....	.....	Total no. of visits ☐
Time:	.....	.....	.....	

Result's codes:
1 accomplished in the farmer's own farm
2 accomplished in another farm
3 accomplished in the farmer's house
4 accomplished in another house
5 accomplished in another place
6 partly accomplished
7 refused the visit
8 farmer is not available
9 others .....

	Field Editor	Office Editor	Coder	Keyer
Name	_____	_____	_____	_____
Date	/ /1998	/ /1998	/ /1998	/ /1998
Signature	_____	_____	_____	_____
	☐☐	☐☐	☐☐	☐☐

Section 1 : Wife's Background

No.	Questions & Filters	Coding Categories	Skip to
101	**Record time**	Hour..... ☐☐ Minute..... ☐☐	
102	How old are you?	Age in completed years ..... ☐☐	
103	Had you ever attended school?	Yes ..... 1 No ..... 2 →	106
104	What is the highest level of school you attended?	Primary..... 1 Preparatory..... 2 Secondary..... 3 Upper intermediate..... 4 University..... 5	
105	What is the highest grade which you successfully completed at this level?	Grade ..... ☐	
106	Where do you throw the garbage and wastes of your house?	In any empty area ..... A In the street..... B In the mesqua..... C In the canal..... D In the collector ..... E On natural fertilizer..... F Garbage car ..... G Other _____ X (specify)	

Section 2: Knowledge and Attitudes towards irrigation and water distribution

No.	Questions & Filters	Coding Categories	Skip to
201	What is the total area of the land your husband is cultivating? What is the area of your husband owned?	Feddan Kirat Cultivated area ☐☐ ☐☐ Owned area ☐☐ ☐☐	
202	How many times did your husband irrigate his land During this winter? How many times by night? During last summer? How many times by night?	**Winter** Total no. of irrigation ☐☐ No. of irrigation by night ☐☐ **Summer** Total no. of irrigation ☐☐ No. of irrigation by night ☐☐	
203	Was this water all from the mesqa or canal (Nile) or do you have any other source(s) of water?	From Mesqa or canal (Nile)..... 1 Other sources..... 2	→ 205
204	What are these sources?	Well/groundwater..... A Drainage ditches..... B Trucked water C	
205	Which irrigation tool does your husband use? Does he own this tool?	Ownership: Yes / No Sakia..... A 1 2 Tanpor..... B 1 2 Diesel pump..... C 1 2 Electrical pump..... D 1 2 Well pump..... E 1 2 Others _____ X 1 2 (specify)	
206	What is the biggest problem your husband faced while irrigating during: Last winter? Last summer? Last Nili ?	Winter / Summer / Nili Shortage of water..... A A A Irregular shifts..... B B B High cost of irrigation C C C Saltiness of water..... D D D Water is cold..... E E E Pump is crowded..... F F F No problem..... G G G Other _____ X X X (specify)	
207	Does your husband make the land even?	Yes ..... 1 No 2	→ 209
208	How does he make the land even?	By hand..... A By cultivator..... B By mechanical cultivator..... C By laser..... D Others _____ X (specify)	
209	In the last year has your husbnd lost crops to lack of water?	Yes ..... 1 No 2	
210	In the last year has your husband left any of his lands uncultivated/fallow due to an inadequate water supply?	Yes ..... 1 No 2	→ 213
211	Was this in summer only or in the whole year?	Summer only..... 1 Whole year..... 2	

No.	Questions & Filters	Coding Categories	Skip to
212	How many feddans?	Area Feddan ☐☐ Kirat ☐☐	
213	Do you have any idea how your husband can use less amount of irrigation water?	Yes ..... 1 No ..... 2 → 215	
214	How?	Irrigation by night..... A Purification of interior mesqas..... B Sprinkler or drip irrigation..... C Irrigation part by part..... D Furrow irrigation..... E Other _____ X (specify)	
215	What are the advantages of irrigation by night?	The required water by night is less.. A Doesn't cause problem with other farmers..... B Decrease of evaporation and transpiration for the benefit of the crop.. C No advantages to be mentioned..... D Land is cold by night ..... E Others _____ X (specify)	
216	What are the problems of irrigation by night?	Can't sleep well..... A Inability to see water while irrigating by night..... B Ability of stealing water by other farmers C Fear of monsters and thieves..... D No problems..... E Humidity ..... F Deficiency of working hands..... G Other_____ X (specify)	

Section 3: Woman's Role

No.	Questions & Filters	Coding Categories	Skip to
301	Do you discuss with your husband the selection of crops he cultivates?	Yes..... 1 No..... 2	
302	How much do you think it is important for your husband to take the cost of irrigation into consideration while choosing the crops ?	Very important ..... 5 Important ..... 4 Not that much ..... 3 Not important ..... 2 Not important at all 1	
303	Do you help your husband in cultivation and irrigation ?	Yes..... 1 No..... 2	→ 306
304	What do you do ?	Helps in irrigation..... A Helps in cultivation..... B Rearing livestock..... C Supervising laborers ..... D Other_____ X (specify)	
305	Approximately how many hours in the week do you help your husband?	Hours ..... ☐☐	
306	Do you have information about the agriculture?	Yes..... 1 No..... 2	
307	Do you discuss with your husband about the cultivation or the use of the irrigation water?	Yes..... 1 No..... 2	
308	Do you discuss with your husband about the cost of cultivation and irrigation?	Yes..... 1 No..... 2	
309	If you suggest something about agriculture or irrigation, Does your husband take your suggestion into consideration or not?	Always take into consideration..... 1 Sometimes take into consideration..... 2 Don't take into consideration..... 3	
310	If your husband speak to you about the problem in irrigation, what do you advice him to do?	Cultivate crop which doesn't need much water..... A Using well water..... B Ask for agricultural engineer's advice.... C Ask for farmer's advice..... D Ask for agricultural society 's advice... E Ask for bahar's advice..... F Irrigate from collector..... G Other _____ X (specify)	
311	Can you convince your husband to change his behavior in irrigation	Yes..... 1 No..... 2	
312	Do you have information about crops' marketing	Yes..... 1 No..... 2	
313	Do you use mesqa's water?	Yes..... 1 No..... 2	→ 315
314	In what ?	Washing..... A Animals and birds drink..... B Other_____ X (specify)	
315	Do you throw any wastes in the mesqa?	Yes..... 1 No..... 2	
316	Do you see any other ladies that throw wastes in the mesqa?	Yes..... 1 No..... 2	
317	Do you wash in the mesqa?	Yes..... 1 No..... 2	

Section 4: Ministry's policy

No.	Questions & Filters	Coding Categories		Skip to
401	Are you aware of any repair or maintenance of the distributor canal that would improve water delivery to your mesqa?	Yes No	1 2	 → 403
402	What can be done?	Purify canal Informing farmers not to throw garbage Expanding canals Expanding drainage Increase water Cover canal Other_____ (specify)	A B C D E F X	
403	Does the water run in the distributor canal in shifts?	Always Usually Sometimes Infrequently Never	1 2 3 4 5	→ 406
404	What is the major cause of this obstruction?	Deficiency of water Unpurified Throwing garbage Parasites Dead animals Other_____ (specify)	A B C D E X	
405	Could this problem be solved by more frequent dredging?	Yes No	1 2	
406	Does the water run in the mesqa in shifts?	Always Usually Sometimes Infrequently Never	1 2 3 4 5	→ 408
407	What is the major cause of this obstruction?	Deficiency of water Unpurified Throwing garbage Parasites Dead animals Other_____ (specify)	A B C D E X	
408	In your opinion ,is the water in the mesqa pure or polluted?	Pure Polluted	1 2	→ 410
409	What are the major causes of this pollution?	Bacteria (bilharzia & e-coli) Pesticide & fertilizer residue Household waste water, soap residue Industrial waste Sewage Dead animals Drainage Other._____ (specify)	A B C D E F G X	
410	How could we protect the Mesqa from this pollution?	Sanitary Purification Fine for throwing garbage/dead animals Cover mesqa Cleaning canal Other_____ (specify)	A B C D E X	
411	If the mesqa was continually cleaned would this increase available water to your husband's land and therefore increase the productivity of his land?	Yes No	1 2	
412	Is the water in the mesqa fresh or saline?	Fresh Saline	1 2	

No.	Questions & Filters	Coding Categories		Skip to
512	Do you think that the current water supply for the country will be adequate for these new projects?	Yes	1	
		No	2	
		Don't know.....	8	
513	When you think of the future, what is greatest concern regarding water for irrigation?	don't reach water.....	A	
		Saltiness of irrigation water.....	B	
		Decline of level of water in high dump	C	
		Cleanliness and availability of water	D	
		Consuming drainage water.....	E	
		Covering canal.....	F	
		Costs of irrigation water.....	G	
		Draught in the future.....	H	
		Other_____ (specify)	X	

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Section 6 : Exposure to Mass Media

No.	Questions & Filters	Coding Categories	Skip to
601	Do you watch T.V.?	Yes ..... 1 No ..... 2 →	612
602	For how many hours on average do you watch T.V. every day? **If less than one hr, record "zero zero"**	No. of Hrs ..... ☐☐	
603	At what time during the day, do you watch T.V.?	Morning..... A Noon..... B Afternoon..... C Evening ..... D Occasionally..... E	
604	Which channels do you prefer?	First..... A Second..... B Third..... C Fourth..... D Fifth..... E Sixth..... F Seventh..... G Eighth..... H	
605	Which are the most preferable programs for you ?	Religious programs..... A Political programs..... B Cultural programs..... C Sports programs..... D Entertainment progrmas..... E Agricultural ..... F Other _____ X (specify)	
606	Do you watch any program that deals with agriculture?	Yes ..... 1 No ..... 2 →	608
607	What are those programs?	Ser el ard..... A Kher baladna..... B Good morning Egypt..... C Ads..... D Other_____ X (specify)	
608	Have you ever watched any program discussing the preservation of water for irrigation on T.V.?	Yes ..... 1 No ..... 2 →	610
609	What did you see?	Ser el ard..... A Informing ads..... B Polluted water from sanitary and industrial garbage..... C Other _____ X (specify)	
610	Have you ever watched any program discussing the contamination of water for irrigation on T.V.?	Yes ..... 1 No ..... 2 →	612
611	What did you see?	Ser el ard..... A Attitudes..... B Belharizia..... C Pollution ads..... D Other_____ X (specify)	
612	Do you listen to the radio?	Yes ..... 1 No ..... 2 →	620

No.	Questions & Filters	Coding Categories	Skip to
613	For how many hours on average do you listen to the radio every day?	No of hrs..... ☐	
614	At what time during the day do you usually listen to the radio?	Morning..... A Noon..... B Afternoon..... C Evening ..... D Occasionally ..... E	
615	Which are the most three preferable programs for you ?	Religious programs..... A Political programs..... B Cultural programs..... C Sports..... D Entertainment..... E Agricultural ..... F Other _____ X (specify)	
616	Do you listen to any program dealing with agriculture?	Yes ..... 1 No 2	→ 618
617	Which are these programs?	Agricultural information..... A Ads..... B Other_____ X (specify)	
618	Have you ever listened to any program discussing the preservation of water for irrigation in the radio?	Yes ..... 1 No 2	
619	Have you ever listened to any program discussing the contamination of water for irrigation in the radio?	Yes ..... 1 No 2	
620	In the last six months have you seen any other entertainment at any other place?	Yes..... .... 1 No..... 2	→ 622
621	What have you seen?	Drama troupe..... A Story teller..... B Local cinema. ..... C Videos programs..... D Mobile videos..... E Other_____ X (specify)	
622	How often do you read a newspaper or a magazine	Daily..... 1 Weekly..... 2 Every 2 weeks..... 3 Monthly..... 4 Don't read..... 5 Can't read..... 6	→ 629
623	Which newspapers and magazines do you read?	Al akhbar..... A El ahram..... B El ghomhoria..... C El mesaa..... D Parties newspapers..... E Local newspapers..... F Other_____ X (specify)	
624	Have you find any issues concerning agriculture and irrigation?	Yes ..... 1 No 2	
625	Have you ever read any issue about preservation of water for irrigation?	Yes ..... 1 No 2	→ 627

No.	Questions & Filters	Coding Categories	Skip to
626	What did you read?	New projects..... A Crops..... B Preserving irrigation water..... C Irrigation methods..... D Other_____ X (specify)	
627	Have you ever read any issue about contamination of water for irrigation?	Yes ..... 1 No ..... 2 →	629
628	What did you read?	Water pollution..... A Industrial wastes..... B Preserving water..... C Claning nile water..... D Other _____ X (specify)	
629	From where did you obtain the most useful information about agriculture?	Irrigation engineer ..... A Employee/agricultural society..... B Neighbours and relatives..... C Television and radio ..... D Farmers..... E Bahar..... F Other_____ X (specify)	
630	Do you attend any local meetings?	Yes ..... 1 No ..... 2 →	634
631	What kind of meetings do you attend?	Religious..... A Population..... B Agricultural..... C Village development..... D Agricultural co op society..... E Other_____ X (specify)	
632	How frequently do you attend these meetings?	Weekly..... 1 Monthly..... 2 Every 6 months..... 3 Yearly..... 4 Other_____- 6 (specify)	
633	Where do you attend these meetings?	Mosque..... A Agricultural co op society..... B Local council..... C Youth center..... D Other_____ X (specify)	
634	Record time	Hour..... Minute.....	