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# Egypt Water Use and Management Project

Engineering Sciences

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**EWUP**

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## Introduction

EGYPT--fertile land and gift of the Nile. Yet today's Egypt faces a future in which the country's agricultural production cannot keep pace with its rapidly growing population.

In a joint effort to solve this problem, the Government of Egypt and the United States Agency for International Development have joined together to form the EGYPTIAN WATER USE AND MANAGEMENT PROJECT (EWUP). Together, 178 Egyptians and 9 Americans strive to increase production on Egypt's small farms and to save the country's precious water. Colorado State University administers American involvement in the PROJECT, drawing support staff from its own ranks and from the Consortium for International Development.



*EWUP advisers and Egyptian farmers work together to improve water management and produce higher crop yields.*

## Objectives

Egyptians farmed their lands successfully for millenia, but farm practices which were adequate for yesterday no longer meet the food needs of today. EWUP recognizes that these practices are age-old, ingrained, and that any effort to change them is no simple matter.

The PROJECT is attacking the problem on three fronts:

--First, it identifies those irrigation and farm practices which reduce food production.

--Second, it develops workable and mutually acceptable methods for improving these practices.

--Third, EWUP carries out pilot projects in the field, introducing Egyptian farmers to the improved irrigation and farm practices specifically developed to meet their needs.



*The first visit -- An Egyptian farmer discusses his irrigation problems with a group of EWUP experts from different disciplines.*





*Measuring water level and taking soil samples to determine the correct level of irrigation.*



*A locally produced ditcher. Complicated and expensive technology is not always the best solution.*



*Land leveling*

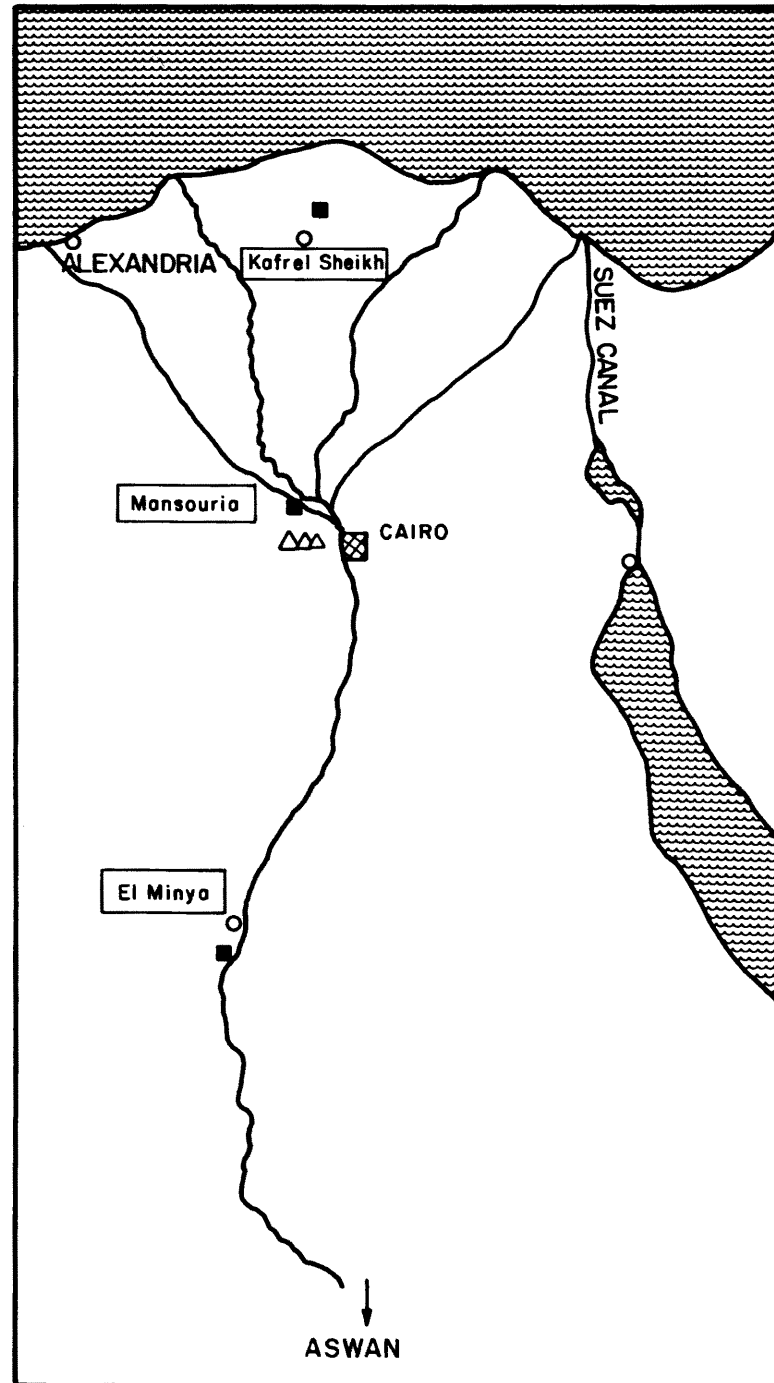
## Study Areas

In 1978 EWUP began its program of applied water management research. It continues to work with Egyptian farmers on their own farms in three target areas, each representative of a major agricultural setting.

KAFR EL SHEIKH, the most northerly, is located in the central Delta, where the high water table leads to problems of soil salinity. Farmers here grow rice and cotton.

MANSOURIA, in the southern Delta near Cairo, is an area of small farms planted primarily with vegetables and citrus fruits.

EL MINYA is representative of the river valley farmlands of Upper Egypt, traditionally watered by means of basin irrigation. Here the farmers grow beans, sugar cane and cotton.





***KAFR EL SHEIKH***

*High yields of rice are possible under good management. Maize borders the rice paddy in the background.*



***EL MINYA***



***MANSOURIA***

## STEP ONE:

### The Problems

EWUP devoted its first years to the task of discovering which irrigation problems lay behind poor production. Its research teams pinpointed three major causes:

--Water enters watercourses irregularly, and often in amounts too small to fill the needs of all the farmers the watercourse serves.\*

--The flow of water within the watercourses is also irregular, and water may reach a vent to the farmers' fields with insufficient force for good irrigation. This problem particularly affects farmers at the tail end of a watercourse.

--Farmers' fields are not level enough to distribute water evenly over the land, forcing the farmers to flood low-lying areas in order to water the higher ones. Modern irrigation techniques require fields varying no more than  $\pm 2$  cm.

*\*For the most efficient irrigation, farmers should be assured a supply of water of at least 28 liters per second on demand, backed by enough head, or water pressure, for gravity flow irrigation.*

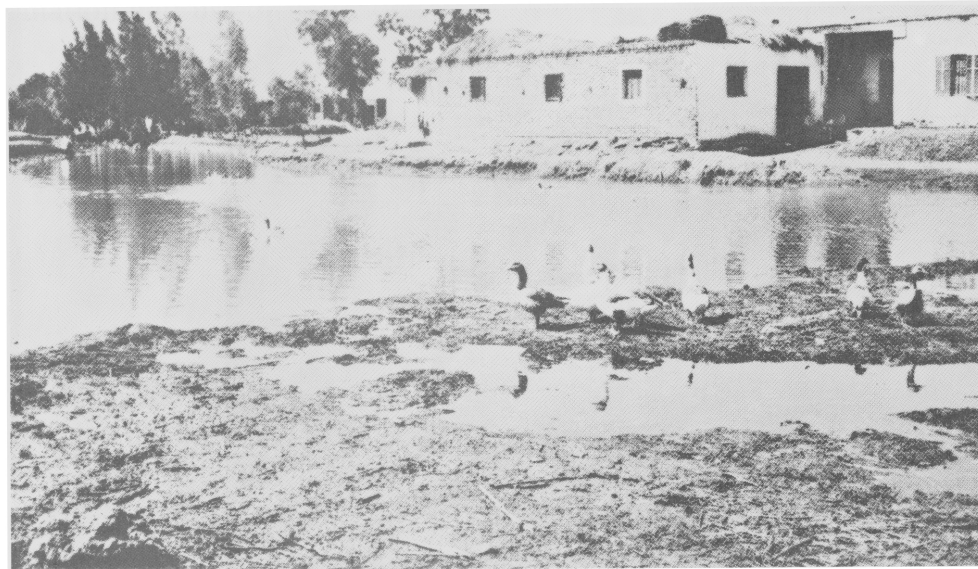
These are the major problems, but they are by no means the only ones. With 90 percent of Egypt's water arriving below field level, the Egyptian farmer must devote a large part of his energies to the task of raising water to his crops. His lifting methods are antiquated and his watercourses are in poor condition--often overgrown with weeds and of irregular shape.



*Egyptian farmers use traditional methods to raise water, most commonly the sakia (the waterwheel shown here) and the Archimedes' screw. The cost of animal power is another complex issue under study by EWUP.*



*Over the years, brickmaking destroys canal and river banks, turning them into veritable lakes.*







*Water-loving buffalo also contribute to the canal banks' destruction.*



*Turnouts in the watercourse often cause deterioration of the field channels.*



*The task of keeping drains and canals free from weeds is too great for the individual farmer and requires community action.*



## STEP TWO:

### The Solutions

Defining problems is only the beginning. EWUP continues to research and test new solutions in the quest for irrigation practices suited to Egypt's particular needs.

**PROBLEM:** Insufficient and irregular water deliveries to *meskas* (*meska* is the Egyptian term for a subsidiary watercourse from which 5 to 40 farmers draw water.)

**SOLUTION:** Elevate the canals and introduce gravity flow distribution.

**PROBLEM:** Uneven flow within the *meska* system, leading to uneven distribution among the farmers.

**SOLUTION:**

- Elevate *meskas* with low pressure pipe and install alfalfa valves at the individual farm gates.
- Line canals and *meskas* to prevent waste through seepage.
- Organize farmers to schedule their irrigations fairly and in the interests of the entire community.

**PROBLEM:** The nearly universal presence of inefficient and outdated farming techniques.

**SOLUTION:**

- Introduce precision land leveling to insure maximum use of irrigation water.
- Institute long furrow and long basin irrigation, along with appropriate changes in agronomic practice.
- Advise farmers on the correct management of large flows of water, when to irrigate, and how much.
- Change cropping patterns to fit the water supply.
- Advise farmers on correct fertilization techniques, plant population and use of pesticides.



*This rice planter is an example of new technology still in the experimental stage. It should save farmers hours of backbreaking work.*

*This concrete platform provides a place for women of the area to do their washing. It makes their task easier and helps to preserve the canal banks.*



*Farmers recognize the advantages of land leveling but such services are difficult to obtain in Egypt. The PROJECT is looking for ways to make precision land leveling available to all.*



## STEP THREE:

### Implementation

From the preceding pages it should be clear that EWUP has directed its initial efforts towards analysis and research. Practical research demands that each proposed solution be implemented in the farmers' fields, so that the development, testing and evaluation of various solutions are all part of a single process. Results observed in Pilot Projects constantly change the shape of that process, and are the final proof of its success.

EWUP's first task in each of its Pilot Project areas was to gain the confidence of the local farmers. By introducing more modern farming methods--precision land leveling, long furrow and long basin irrigation, improved fertilization methods, more scientific cropping and pest control--PROJECT experts dramatically increased crop yields in a short time. Their success won over the farmers, insuring their cooperation in the many long-term practices, less spectacular in their results but no less necessary, for improving the country's water management system.

EWUP recognizes that the success of its experiments depends on the wholehearted acceptance and cooperation of Egyptian rural communities. Farmers work as full partners with the PROJECT, and research takes place in their own fields rather than on separate test plots. In this way, EWUP experts benefit from the farmers' long years of experience while teaching them improved farm practices.



*An EWUP representative discusses irrigation problems with two farmers. Only after the PROJECT has a clear idea of present farming and irrigation practices can it hope to effect changes beneficial both to individual farmers and to the country as a whole.*



*An EWUP agronomist demonstrates insecticide application. Dramatic increases in crop production due to improved agronomic practices gain the confidence of farmers and help to insure future cooperation.*

# KAFR EL SHEIKH

## Delta Pilot Project

EWUP representatives have introduced modern farming practices into the area and organized farmers into effective irrigation associations. These associations deal with problems which concern the entire community, and which are too large for the individual farmer to handle. They schedule irrigation times among the farmers, attempting to eliminate inequities. The farmers clean canals and drainage ditches and, with engineering help, rebuild ruined *meskas* to make them more efficient water carriers.

EWUP scientists also propose to eliminate a number of shallow drains in Kafr el Sheikh which are ineffective, thereby increasing the land area available for crops.



*The application of zinc fertilizers to rice nurseries brought about this substantial increase in the size of rice transplants.*



# MANSOURIA

## Pilot Project near Cairo

In Mansouria, EWUP has also introduced modern farming techniques and organized Irrigation Associations. In addition, the PROJECT is installing a low pressure pipeline, has uplifted another watercourse, has improved a branch canal and several *meskas* and is producing the conditions necessary for gravity flow irrigation.



*A project adviser checks the degree of water loss in a watercourse in Mansouria, near Cairo.*



## EL MINYA

### Pilot Project in Upper Egypt

In Minya, after having organized Irrigation Associations and modernized farm practices, EWUP raised a *meska* to improve an existing irrigation system partially based on gravity flow. The PROJECT has installed a diesel pump to lift water to the *meska* until the branch canal can be raised.



*This Minya meska has been raised and straightened and its mud gates replaced by sturdy brick structures. The new construction provides gravity flow irrigation for the whole meska, cutting the time of irrigation for farmers at the tail end from an entire day to a few hours. Farmers report that the new meska saves them time, labor and money, and project advisers hope to demonstrate in the future that it saves water as well.*

# CONCLUSION

It is too early to speak of final results from the work of the EGYPTIAN WATER USE AND MANAGEMENT PROJECT, but the following statistics give an idea of what the PROJECT has achieved in its first few years of operation:

Crop	Production Increase	Pilot Project Site
rice	30%	Kafr el Sheikh
cotton	36% 41%	Kafr el Sheikh El Minya
wheat	80%	El Minya
maize	200%	El Minya
mean grain yield	33% greater than that of non-project areas	all three sites
straw (Sahka 8 variety)	36% greater than that of non-project areas	all three sites

PROJECT farms show a startling 10% increase in land area irrigated due to the elimination of unnecessary drains, bunds and farm ditches.

Furthermore, in the 1979-80 wheat field trials, grain yields were increased 42%, water lifted was reduced 34%, irrigation time was reduced 33% and irrigation efficiency was increased 60%. Although no specific figures are available for 1980-81 yet, approximately the same results were obtained.

An impressive beginning, and EWUP has reason to hope for a more impressive future when the solutions it has developed through careful research will be in full operation in the field. The improved irrigation practices will enable the farmers to utilize Egypt's rich lands to their maximum potential to produce food.



## **EGYPT WATER USE AND MANAGEMENT PROJECT**

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