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THE IMPACT OF RURAL WATER SUPPLY PROJECTS ON WOMEN

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PURPOSE

The purpose of this report is to present information concerning the effects of rural self-help water supply projects on:

1. The time used by rural women to collect water,
2. The manner in which the water is used by the household,
3. The daily activities of rural women,
4. Women's perception of the benefits of water projects, and
5. Women's perception of problems with the water projects.

BACKGROUND

Self-help water projects are one manifestation of Harambee (pull together for self-help), a policy formulated by Kenya's President, Mzee Jomo Kenyatta. In keeping with this policy, rural communities are encouraged to identify their development needs and to contribute money and labour to the projects they institute to meet these needs.

Once a community has identified the need for a water project, it forms a community-based management committee to organize and promote the project. All self-help projects must be registered with the government. It is the responsibility of the management committee to register the self-help water project with the District Community Development Officer, Ministry of Housing and Social Services. Registration confirms approval of the project and is a precondition for fund-raising. It is also the responsibility of the management committee to apply to the Ministry of Water Development which undertakes the technical design and supervises the construction of most self-help water projects.

The Ministry of Water Development has set up certain operating standards for the design of rural water projects based on population, farming statistics and local institutional needs. Usually the systems are designed with the agricultural potential of the area in mind. The agricultural potential of an area is defined on the basis of rainfall. However, local factors such as the concentration of rainfall, adverse topography, soil conditions, irrigation, roads, social attitudes and tourism are also taken into account.

1. High potential. A high potential area is normally considered to be an area with an annual rainfall of more than 1000 mm.
2. Medium potential. A medium potential area is normally considered to be an area with an annual rainfall of between 500-1000 mm.
3. Low potential. A low potential area is normally considered to be an area with an annual rainfall of less than 500 mm.*

Self-help water projects are designed and costed in phases: the first phase brings water to a central point, and later phases extend the water either to communal water points or to individual homes. As specified in Kenya's Development Plan 1974-1978:

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*These definitions are taken from the Ministry of Water Development, Design Manual Draft, Nov. 1976, Section 6. 002 and are subject to revision.

The basic rural services standard is defined as a communal water point to serve the domestic and livestock needs of a population:-

(a) within 2 kilometres in high potential areas;
(b) within 5 kilometres in medium potential areas; and
(c) within an appropriate larger radius in areas of low potential and sparse population.

The specifications of these small self-help projects should conform to an already existing designed project so that the two can be combined when a bigger public water supply is constructed.

The project's costing is included with the design. Once a community has the design in hand, it is expected to provide enough money to begin construction. Once the community can demonstrate that it has made a financial and physical contribution to the project, it can apply for financial assistance toward the cost of completing a phase of the water supply systems. The community can apply for a District Development grant to the District Development Committee on which sit the district-level heads of government departments, members of parliament and local councillors. One function of the District Development Committee is to allocate government-provided Rural Development Funds to assist high priority self-help projects. In addition, the community can apply, through the Ministry of Housing and Social Services, for special assistance through organizations like CARE-Kenya, Freedom from Hunger or the Charity Sweepstakes. All projects used in this study have been assisted by CARE-Kenya, through a grant from US/AID. Although there is considerable variation from project to project, figures compiled by CARE-Kenya for 49 projects assisted by CARE during 1976-77 give some idea of the extent of community contributions to their own water projects.

Financial Distribution of Inputs

Input	$	% Of The Total Cost Of A Phase
Community: labour and materials	548,209.43	41%
Government/District Development Committees	404,606.03	31%
CARE-Kenya	380,665.00	28%
Total	$1,333,480.46	100%

No matter what the source of funds, the actual construction of a self-help water supply system is undertaken by community members, with supervision and technical advice from the Ministry of Water Development. Rural women are actively involved in this work, both as members of project management committees and as volunteer labourers.

Once the water supply system has been installed, there are several possible arrangements for financing its operation and maintenance.

In some communities, this responsibility is left to the project management committee. Where water is piped to individual homes, the committee usually assesses a monthly household charge. Where water is taken from communal water points, fees are charged as the water is collected. In other communities, water supply systems are maintained and operated by the local county council, and no fees are charged to users. In still other communities, the Ministry of Water Development charges a yearly operation and maintenance fee and in turn takes over the operation of the system once the project management committee has collected and paid the estimated cost of this service.

METHOD

Design

The information in this report was obtained through interviews with fifty women in four rural communities before and after* the installation of water supply systems concerning:

- water collection,
- water use,
- household and agricultural activities,
- attitudes toward and satisfaction with the water system project.

The Sample

The surveys conducted before the installation of the water supply system were undertaken by CARE to provide baseline information for later evaluations of the effect of CARE-assisted water projects. Overall, CARE has conducted baseline surveys in 53 communities since 1975. In 1976, CARE, assisted by the Bureau of Educational Research, University of Nairobi, developed a questionnaire to provide information about a range of women's activities, in addition to water collection. This questionnaire has been used by CARE since September 1976 (see Appendix 2).

To obtain preliminary indications of the effect of the water supply systems for the present study, follow-up surveys were conducted in four communities during October 1977. Communities were selected to provide information concerning the effects of differences in accessibility of water within high, medium and low potential agricultural areas. The characteristics of the four communities selected for follow-up surveys are shown below:

Agricultural Potential	Water Distribution	
	Communal Water Points (C.W.P.'s)	Individual Ho...
High potential	Muguna-Kirimaitune, Eastern Province	Karveti, Cent... Province
Medium potential	*Nyabera, Nyanza Province	Nyabera, Nya... Province
Low potential	Katothya, Eastern Province	

The procedure used to obtain respondents for both baseline and follow-up surveys was to hold a public meeting (baraza) for the community

*The baseline survey in Nyabera had been conducted in September 1975. Therefore, available baseline information did not include the details concerning women's activities required for this study. Therefore, in this community, comparison is made between a group of 50 users of the water supply scheme and 50 non-users, both interviewed in October 1977.

women and to select 50 women attending the meeting to be interviewed These women were generally the major women of the household - the wife of the household head, or in some cases, the head of household. The women interviewed for the follow-up surveys were not necessarily the same as the women who were interviewed for the baseline.

Methods of calculation

Information regarding methods of calculation can be obtained from the authors.

Figures opposite could be influenced by:

1. Season of year
2. Change in patterns of clothes-washing (at source or home)

It's also unclear whether one trip means one person or could be mother + daughter(s)

SUMMARY OF FINDINGS

The data available concerning water collection and water use in twelve settled rural agricultural communities in Kenya suggests the following conclusions:

1. If time per trip to collect water decreases, the number of trips per day tends to increase. This relationship holds true for all households in the study that use either natural water sources or communal water points.

Average Number Trips Per Day, By Time Per Trip (In Per Cent)

Time Per Trip	Average Number Trips Per Day	Households
Mugura - Kirimagitune Before (natural)		
Under 2 hrs.	2.0	2
2 hrs. - Under 3 hrs.	1.1	42
3 hrs. - Under 4 hrs.	1.1	50
4 hrs.	2.0	6
		100 %
Muguna - Kirimagitune After (communal water point)		
Under 2 hrs.	3.5	46
2 hrs.	3.0	48
Over 2 hrs.	2.7	6
Katothya - Before (natural)		
Under 2 hrs.	3.6	14 %
2 hrs. - Under 3 hrs.	2.8	28
3 hrs. - Under 4 hrs.	2.4	36
4 hrs. - Under 5 hrs.	2.3	20
Over 5 hrs.	2.0	2
Katothya - After (communal water point)		
Under 3 hrs.	2.3	26
3 hrs. - Under 4 hrs.	2.0	32
4 hrs. - Under 5 hrs.	1.4	26
Over 5 hrs.	1.3	16
Karweti - Before (natural)		
Under 1 hr.	5.0	11
1 hr. - Under 2 hrs.	4.4	38
2 hrs. - Under 3 hrs.	3.8	35
3 hrs. - Under 4 hrs.	2.8	10
4 hrs. - Under 5 hrs.	3.0	4
Over 5 hrs.	1.0	2
Karweti - After (piped water)		
Under $\frac{1}{4}$ hr.	4.2	22
$\frac{1}{4}$ - Under $\frac{1}{2}$ hr.	3.6	42
$\frac{1}{2}$ hr. - Under 1 hr.	4.2	38
Nyabera - Non-Users (natural)		
$\frac{1}{2}$ hr. - Under 1 hr.	4.0	20
1 hr. - Under 2 hrs.	3.8	18
$2\frac{1}{2}$ hrs. - Under 3 hrs.	3.5	31
3 hrs. - Under 4 hrs.	2.3	13
4 hrs. - Under 5 hrs.	1.5	11
5 hrs. - Over	0.2	7

DATA LIMITATIONS

Reliability

In all settings, respondents' reports of their activities usually are less reliable than observations. We would expect responses obtained in this study to contain the predictable distortions of the survey method. In addition, we feel that responses to questions about use of time should be read as approximations, since watches are uncommon in rural Kenya and awareness of time generally low.

Representativeness

All information comes from communities with CARE-assisted water projects. We stress that the method of sample selection and the few communities studied prevent generalization of the data beyond these particular communities. Thus, all findings should be understood as providing case-study information about individual communities and NOT as providing a description of rural Kenyan women.

In addition, respondents were picked from among a larger group of women who had chosen to attend a public meeting. We cannot ignore the possibility of loss of representativeness at these two selection points.

Comparability

Since respondents in the follow-up samples were not necessarily the same women as respondents in the baseline samples, before-after differences reflect individual variations as well as the effects of the water systems. Therefore, this report stresses mean-differences between the "before" and "after" samples and avoids drawing conclusions on the basis of shifts, especially small shifts, in practices between the two groups. for illustration of effect see p 27

In addition, follow-up surveys were conducted at a different time of the year than the baseline surveys. Without before-after information collected at comparable points in the agricultural cycle, it is difficult to separate the effects of seasonal variations from the effects of the water systems on women's agricultural activities. Therefore, this report confines itself to an examination of the effects of the water systems on the time women spend collecting water and avoids speculation about possible consequences upon women's use of time for other activities.

STUDY SIGNIFICANCE

We view these case studies as a necessary first step in the formulation of a more controlled investigation of the impact of different levels of water accessibility in different ecological zones. The points of similarity and differences between these four communities suggest relationships and raise questions that provide a framework for future research. The experience of this investigation also provides guidance concerning improved ways to obtain time-activity information from

Time Per Trip	Average Number Trips Per Day	Households
Nyabera - Users (communal water points)		
Under ½ hr.	4.6	63
½ hr. - Under 1 hr.	4.3	18
1 hr. - Under 1½ hrs.	4.0	12
1½ hrs.- Under 2 hrs.	2.0	7
Nyabera - Users (piped water)		
Under ¼ hr.	5.6	100%

2. On the average, households that have to travel to natural water sources or communal water points tend to limit themselves to not more than six hours per day for water collection. Although some households spend more than six hours, in general households tend to choose to make any of the number of trips per day that will not require more than six hours in total and to avoid making an additional trip when it would bring them much over the six hour total time period.

3. If water is brought closer to a community, households will use some to all of the time saved to increase the amount of water they collect for household and animal use. They will not necessarily use the saved time for other purposes. Data do not justify this conclusion at all.

4. A rough indication of the extent to which a community will opt for increased water collection or per increased use of time for other activities is provided by the distribution of a load of collected water. In communities where single loads are normally divided among several purposes, an initial effect of a closer water supply will be more trips for water. In the first community?

   In communities where there is a high proportion of single-purpose trips, the amounts of collected water are more adequate for household needs, and there is greater likelihood that more of the saving in time will be invested in activities other than water collection.

5. For the women we interviewed, a closer supply of water does not mean a reduction in workload. In all communities of this survey there is a noticeable decrease in the assistance provided by other household members for water collection after installation of the water projects. Thus, the women who now travel to communal water points are spending on the average at least as much time per day in water collection as they did when they traveled to natural water sources.

MUGUNA-KIRIMAGITUNE

The Setting

Muguna-Kirimagitune is located in Meru District, Eastern Province, about 10 miles from Meru town. The community has approximately 8,000 residents, one health centre, four markets, five primary schools and eighteen nurseries. Muguna-Kirimagitune is located in a high potential agricultural zone. Crops are grown for food and for cash. Subsistence crops include maize, potatoes, beans, and, to a lesser extent, other vegetables like peas, cabbages, tomatoes and onions. Almost every respondent in both the "before" and "after" samples reported that she grows maize, potatoes and beans. Major cash crops are pyrethrum, maize, potatoes, beans, wheat, peas and dairy products. There are about 4,500 grade cows in the community, and cattle are important source of income.

Prior to the construction of the water project, the community obtained water from three streams flowing from the Mt. Kenya forest. Residents generally travelled between four and eight miles through the forest to collect water. The water was carried on the carrier's back in a mitungi (22-litre can) which is strapped to the carrier's chest. Mitungis are still used to carry water from distribution points to residents' homes.

In 1972, a committee of community members was formed to begin raising funds for a self-help water project. Between 1972 and 1975, preliminary studies were made, and three 14,000-gallon storage tanks were constructed. In 1976, the Methodist Mission in the area hired an engineer to design the water project. The design received the approval of the Ministry of Water Development during that same year. Actual construction began in March 1976, and consumers began using water from communal distribution points in May 1977.

The project was designed to collect water from a stream in the Mt. Kenya forest behind a concrete weir (dam) from which it flows by gravity through a series of PVC pipes with break pressure tanks to a main 14,000-gallon storage tank. At present, water flows from this forest tank to the health centre, one market centre, two primary schools and one additional storage centre. When the project is completed, the remaining community institutions and four additional storage facilities will receive water.

The contributions of the community and various other groups to the scheme to date are as shown.

Capital Expenditure

		Materials	Labour
1.	Community Input		
1.1	Intake, part of gravity main piping, storage tanks, break-pressure tanks	$10,727	-
1.2	Labour	-	$2,980
2.	Government of Kenya/County Council		
2.1	Cement	$ 55	-
3.	CARE-Kenya		
3.1	Piping for gravity Main	$ 8,565	-
	Sub-total (direct cost)	$19,347	$3,980
	Overheads		
4.	Methodist Mission		
4.1	Design and administration estimates	-	$1,500
5.	CARE-Kenya		
5.1	P and O	-	$2,484
	Total	$19,347	$6,964
	Total materials and labour	$26,311	
	Estimated total cost	$119,190	

Maintenance costs of the water supply system are being paid by the users through a monthly fee system.

The baseline survey in Muguna-Kirimagitune was conducted during July 1976, which is the period between the long rains and the short rains. The follow-up survey was conducted during October 1977, at the beginning of the short rains. Thus, respondents in the "before" sample were interviewed during a dry period, when they were engaged primarily in harvesting and collecting vegetables. Respondents in the "after" sample had access to rain water, in addition to the water they collected from the distribution points. At this, the beginning of the second agricultural season, their major activity was land preparation.

The average family size reported by the "after" sample was 7.9. (This question was not asked of the "before" sample). Farms averaged 8.7 acres for both samples.

1. Overview

In this community, the water supply system has reduced the average time for a single water trip from 2½ to 1 hours. A major effect of this reduction has been to increase the available choices regarding the number of trips per day, the amount of time spent collecting water and the time of day to make water trips.

This contradicts figs. reported in table

Most of the households in the "after" sample are now making three (64 per cent) or four (26 per cent) trips per day for water. In the "before" sample, most households (86 per cent) made two trips per day. As a result, there is an almost 50 per cent increase in the average amount of water collected each day. More collected water is being used for all water-related activities, especially for animals, washing clothes and bathing. This increase occurred at a time when rainwater also was available for household and animals use. It suggests that, before installation of the water system, in most households, the amount of water being collected and

was felt to be insufficient. Thus, the water supply system has been used primarily to increase cleanliness, sanitation and care of animals, not to make more time available for other activities. There is only a small reduction in the average total time per household for water collection.

To the extent that the water supply system has decreased workloads, it is the men and the school-aged children, rather than the housewife, who have benefited. There is a noticeable decrease in the assistance provided by other family members with water collection after installation of the system. Since collecting water is viewed as the woman's responsibility, once the trip is safer (no longer through the forest) or less taxing (shorter), women seem expected to manage on their own. When asked about their previous day's activities, respondents in both the "before" and "after" samples report spending an average of five hours collecting water. Both before and after installation of the system, collecting water remains a woman's single most time-consuming activity, accounting on the average for one-third of her time between waking and going to sleep.

2. Time and Trips

The water supply system has reduced the average time for a single water trip from approximately $2\frac{1}{2}$ to $1\frac{1}{2}$ hours. One effect of this reduction in time has been to increase the number of trips made daily for water. On the average, households now make 3.2 trips to the distribution points, compared to the average 2.2 trips to the streams made before installation of the system. Because of this increase in the number of trips made each day, the average total time spent daily collecting water after installation is only about three-quarters of an hour less than the average total time spent daily before installation.

Table 1

Average Number Trips And Average Time Per Trip And Per Day Before And After Water System

	Before	After
Average number trips	2.2	3.2
Average time per trip	2 hrs. 36 min.	1 hr. 35 min.
Average total time per day	5 hrs. 37 min.	4 hrs. 54 min.

Both before and after installation, all households were making a minimum of two trips daily for water. Before installation, most households made only these two trips, spending an average total time of $5\frac{1}{4}$ hours. It seems that making even one more trip increased the total time per day to the point of impossibility for most households. After installation, households have more choices. A few households have chosen to save time and still make the minimum two trips. Most (64 per cent) have chosen to

spend approximately the same total time daily in order to obtain an additional load of water. But four trips per day is also a possibility, chosen by those households (26 per cent) who now average an hour per trip and only 4½ hours in total each day.

Table 2

Number Water Trips Per Day
Before And After Water System (In Per Cent)

Trips	Before	After
2 trips	86	10
3 trips	12	62
4 trips	-	26
5 trips	2	2
Total	100%	100%

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day
Before And After Water System

	Before		After	
Trips	Average Time Per Trip	Average Total Time Per Day	Average Time Per Trip	Average Total Time Per Day
2 trips	2 hrs. 37 min.	5 hrs. 16 min.	1 hr. 54 min.	3 hrs. 48 min.
3 trips	2 hrs. 24 min.	7 hrs. 15 min.	1 hr. 42 min.	5 hrs. 7 min.
4 trips	-	-	1 hr. 6 min.	4 hrs. 28 min.
5 trips	2 hrs. -	10 hrs. -	1 hr. -	5 hrs. -

The relatively small decrease in average total time spent daily to collect water should not obscure the fact that households now increasing their number of trips are spending less time per day collecting water. Thus, although the modal time spent for water collection before and after the installation of the system is six hours, half the households in the "after" sample are spending less than this amount of time, compared to a third of the households in the "before" sample.

Table 4

Total Time Per Day For Water Trips
Before And After Water System (In Per Cent)

Total Time Per Day	Before	After
Under 3 hrs.	2	4
3 hrs. - Under 4 hrs.	-	18
4 hrs. - Under 5 hrs.	32	26
5 hrs. - Under 6 hrs.	-	4
6 hrs. - Under 7 hrs.	52	40
7 hrs. - Under 9 hrs.	8	4
9 hrs. - Under 10 hrs.	6	4
Total	100%	100%

3. Water Use

As shown by the increased number of trips, a major effect of the water supply system has been to increase the average amount of water collected and used daily. Households in the "after" sample were collecting and using almost fifty per cent more water than households in the "before" sample. This increase in collected water is especially noteworthy since the baseline survey was carried out during the dry season, and the follow-up survey was carried out in October when rainwater also was available for household and animal use.

Table 5

Average Total Litres Collected Daily
In Single And Multi-Purpose Trips

	Before	After
Average total litres collected daily	46.5*	69.0*
Average total litres collected in single-purpose trips	1.8(4%)	22.4 (32%)
Average total litres colleced in multi-purpose trips	44.7(96%)	46.6 (68%)

* Calculated 1 load = 22 litres

Most households in both the "before" and "after" samples are using the water that they collect for the same purposes. The one exception is washing clothes. Twice as many households in the "after" sample (62 per cent as compared to 30 per cent in the "before" sample) are using collected water to wash

clothes at home instead of at the streams*

Table 6

Proportion Of Households Using Water Daily, By Purpose

Purpose	Proportion Households	
	Before	After
Cooking	100%	100%
Drinking	58%	60%
Washing utensils	84%	100%
Washing clothes	30%	62%
Cleaning - not specified	6%	-
Bathing	78%	72%
Animals	88%	70%

A comparison of the allocation of water between different purpos before and after the installation of the water system shows tha more water is being used for every activity and that a great dea more water is being used for animals, for washing clothes and fo bathing. When a load of water is divided among several uses, eg cooking, drinking and washing utensils, we do not know the amou allocated for each purpose. We can assume, however, that when load is used for fewer different purposes, e.g. two instea three, each is receiving at least some more water. In this particular case, because they make more trips for water, househ in the "after" sample are able to divide each load among fewe different purposes and therefore have more water to use for ea of them.

Table 7

Daily Water Trips, By Purpose, Before Water System

Purpose	Multi-Purpose Trips*				Single Trips**
	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	2	24	59	18	-
Drinking	2	14	20	36	-
Washing utensils	1	21	38	5	-
Washing clothes	1	2	10	3	2
Cleaning - not specified	1	1	1	-	-
Bathing	1	15	23	8	1
Animals	2	15	27	6	1

*As noted in White, et al. Drawers of Water, when the water source close, a woman can choose between washing clothes at the source o home. As the distance to the water source increases, women tend prefer to wash clothes at the source while waiting to collect wat

Table 8

Daily Water Trips, By Purpose, After Water System

Purpose	Multi-Purpose Trips*				Single-Purpose Trips**
	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	-	2	36	56	4
Drinking	-	2	21	8	3
Washing utensils	-	1	23	32	1
Washing clothes	-	-	8	14	9
Cleaning - not specified	-	1	-	-	-
Bathing	-	1	13	16	11
Animals	-	-	10	8	23

* A load used for more than one purpose

** A load used for one purpose

In addition, as shown in Table 5, because they make more trips for water, households in the "after" sample are able to use more loads of water for only one purpose. A comparison of the average amounts of collected water from loads that were used for only one purpose before and after the water supply system shows increases for all water-related activities and great increases for animals, bathing and washing clothes.

Table 9

Average Litres Water Per Day From Single-Purpose Trips, Before And After Water System

Purpose	Before	After
Cooking	-	1.75
Drinking	-	1.32
Washing utensils	-	0.40
Washing clothes	0.9	4.0
Cleaning - not specified	-	-
Bathing	0.4	4.80
Animals	0.4	10.10

* Calculated as 1 load = 22 litres

4. Time Use

Another effect of the water supply system seems to be more flexibility in use of time. Before installation of the system, the general pattern of water collection was a morning trip, started at around 8 a.m., and an afternoon trip, started at around 2 p.m. Trips started at these two times account for half the trips made by households in the "before" sample. Households in

the "after" sample are making about 10 per cent of their total trips at all hours from 7 a.m. to 5 p.m., except during lunchtim This difference suggests that the decrease in length of the ave trip has increased the convenience of collecting water.

Table 10

Time Of Day Water Trips Started Before And After Water System (In Per Cent)

Time Of Day	Per Cent of All Trips	
	Before	After
	(N=104)	(N=158)
6 a.m.	3.8	2.5
7 a.m.	4.8	13.3
8 a.m.	31.8	13.9
9 a.m.	6.7	10.2
10 a.m.	1.0	9.5
11 a.m.	1.0	8.2
12 noon	-	3.8
1 p.m.	1.9	3.8
2 p.m.	28.8	7.6
3 p.m.	5.8	10.2
4 p.m.	9.6	8.2
5 p.m.	4.8	8.2
6 p.m.	-	0.6
Total	100.0%	100.0%

5. Women's Workload

We have examined the effect of the water supply system upon the time used by the household as a whole. We now look at the effect upon the women we interviewed (housewife). One effect of the water supply system is a decrease in the assistance provided by other household members. In the "before" sample, 56 per cent of the respondents made all household water trips; in the "after" sample the percentage increases to 84. The eight water carriers other than the respondent in the "after" sample were all women; in the "before" sample both males and females assisted by regularly making and/or sometimes making water trips. Younger children (under 10) of both sexes also no longer help with this chore.

Table 11

Household Water Carriers Before And After Water System (In Per Cent)

Carriers	Households	
	Before	After
Only housewife makes all trips	56	84
Housewife or another carrier makes all trips	38	14
Housewife does not make all trips	6	2
Total	100%	100%

Table 12

Ages And Sex of Other Household Water Carriers Before And After Water System

Age/Sex	Number Carriers Before	After
Females 20 and over	1	4
Females between 11-19	7	4
Females 10 or under	7	-
Males 20 and over	4	-
Males between 11-19	8	-
Males 10 or under	-	-

As a result of this decrease in assistance, the benefits of saved time accrue to other family members not to the housewife. When asked about their previous day's activities, these respondent - housewives in both the "before" and "after" samples report having spent an average of approximately five hours collecting water. For women, collecting water remains their single most time-consuming daily activity, accounting for one-third of their time between waking and going to sleep.

Table 13

Average Time Spent By Respondents On Previous Day's Activities Before And After Water System (In Hours and Per Cent)

Activity	Before Time	Before % of Total	After Time	After % of Total
Collecting water	5 hrs. 5 min.	32%	4 hrs. 51 min.	33%
Cooking	2 hrs. 45 min.	17%	2 hrs. 26 min.	17%
Eating and drinking	1 hr. 28 min.	10%	50 min.	6%
Cleaning: clothes, utensils and house	1 hr. 29 min.	10%	1 hr. 38 min.	11%
Bathing	5 min.	-*	12 min.	2%
Caring for children	41 min.	5%	47 min.	5%
Farming	31 min.	3%	1 hr. 43 min.	12%
Collecting vegetables	32 min.	3%	15 min.	2%
Caring for animals	1 hr. 35 min.	10%	34 min.	4%
Milking	37 min.	3%	31 min.	4%
Collecting firewood	17 min.	2%	23 min.	3%
Marketing	2 min.	-*	11 min.	1%
Working outside the home	17 min.	2%	-	-
Crafts	31 min.	3%	-	-
Resting/leisure	1 min.	-*	4 min.	-*
Average length of day	15 hrs. 25 min.	100%	14 hrs. 30 min.	100%

* Less than .5%

There are a number of shifts in average time spent for the previous day's activities between the "before" and "after" sampl especially the time spent farming which increased from an averag of ½ hour to an average of 1¾ hours per day and caring for animals which decreased from an average of 1½ hours to ½ hour per day. An increase in time spent farming at the beginning of an agricultural season can be expected. Without baseline information collected during a comparable agricultural season, it is difficult to know whether this change reflects seasonal variation only or is also can be attributed to the water system. Similarly the decreased time caring for animals can be expected at a time of the year when fodder becomes more plentiful.

6. Women's Perception of the Benefits of the Water Supply System

In the follow-up survey, respondents were asked what difference the water system had made for their children. Of the 47 women with children, only one said that the system had made no difference In the perception of most respondents, the primary benefit has been increased cleanliness of person or clothes, which was mentioned in over half the responses. Presumably statements like "they look more smart" also involve cleanliness, but since cleanliness was not mentioned specifically, these responses - only counted when there was no additional specification - have been kept separate. Perhaps more interesting are the mentions of less illness. The relatively high number of these comments made in a free reponse situation suggests a general awareness of the connection between cleanliness and health. This awareness may be one reason that women in this community have chosen as the primary benefit of the water supply system more water, rather than more time for other activities.

Table 14

Benefits To Children Of Water System (In Per Cent)

Comments	Responses
	(N=72)
Cleaner, bathe more often	47
Cleaner clothes, washed more often	7
Look smarter	11
Less illness	17
Comments involving time: spend more time on schoolwork, not late to school, eat better (because of mother's saved time)	18
Total	100%

Respondents also were asked how the water supply system had affected them and the other adults in their households. Comments concerning more water, either for cleanliness or for animals, account for almost forty per cent of the responses. Personal benefits of walking less, being less tired, more free or more safe account for slightly over 20 per cent of the responses. Slightly under 20 per cent of the comments mention spending more time on other activities. An equal number mention problems arising from the time or labour of assisting the construction of the water supply scheme.

Table 15

Benefits To Respondent And Other Adults Of Water System
(In Per Cent)

Comments	Responses
	(N=91)
Cleanliness	
Wash clothes, utensils more	16
Bathe more	10
Improved appearance	4
Personal benefit	
Less walking, more free	10
Safer trip	7
Less tired, health better	5
More time for other activities	
Prepare meals more regularly, better	11
Attend more meetings	5
More farming	1
Better care of animals	
Animals drink more	10
Animals walk less	2
Problems from assisting in construction of water system	
Health problems	16
Not enough farming	3
Total	100%

The final question concerning possible benefits of the water supply system asked respondents whether, now that they receive water nearer their homes, they had more time to do things that they could not do before. Almost all (94 per cent) answered "yes". Their answers to the probe "what things are you doing now that you could not do before?" emphasize farming and care of animals.

This question has not adequately elicited respondents' perceptic of the effect of the water system upon their range of activities In part, this is because of the ambiguity in the phrase "things

They know what the interviewer wants to hear: that their time will be spent "usefully"!

you could not do before". In part, also, this is because the question stresses time, which in this community has been a secondary rather than primary effect of the water system.

Table 16

Things Done Now That Were Not Done Before Water System
(In Per Cent)

Comments	Responses
	(N=96)
Farming	
More time farming - not specified	36
Take better care of animals/give animals more water	19
Improved practices - spray, irrigate or weed	5
Plant more/new vegetables	4
Milk	3
Household	
Clean home more often, better	6
Take more care of children (excluding bathing and clothes	4
Wash clothes more often	4
Prepare meals more regularly, improve nutrition	2
Bathe children more often	1
Mud the house	1
Other	
Spend more time in groups	10
Entertain, visit friends	2
Rest	2
Market	1
Total	100%

In the baseline survey, respondents were asked two questions about their desired use of extra time. One question was about household and agricultural activities: "If you had more time, what would you like to do to take care of your home, or your farm, or your children that you cannot do now?" Responses are fairly equally divided between the desire to improve farming, especially to cultivate more or new kinds of vegetables, and the desire to improve home conditions. One-third of the responses mention activities requiring (more) water: keeping a cleaner house, washing clothes more often, bathing, especially children more frequently and giving more water to the animals. It is latter area of concern that has been most immediately satisfie through installation of the water supply system.

Table 17

Household And Agricultural Activities Respondents Want To Undertake If They Have More Time (Asked Before Water System, Only) (In Per Cent)

Comments	Responses
	(N=152)
Farming	
Plant more new vegetables	25
Improved practices - spray, irrigate, weed	6
Keep more animals/poultry	6
Take better care of animals/give animals more water	4
More time farming - not specified	1
Household	
Take more care of/spend more time with children (excluding cleaning)	13
Clean home more often/better	13
Clean children more often/better	9
Prepare meals more regularly, e.g. lunch improve nutrition	7
Wash clothes more often/better	3
Mend/knit/sew	3
Mud/house build better house	3
Fetch water	1
Other	
Join/spend more time in groups	4
Entertain/visit friends	1
Rest	1
Total	100%

The second baseline survey question about desired use of extra time dealt with community activities: "If you had more time, are there any groups, or projects, or classes you would like to join?" Responses show a strong desire for acquisition of literacy.

Table 18

Groups, Projects and Classes Respondents Want To Join If They Have More Time (Asked Before Water System, Only) (In Per Cent)

Group, Project or Class	Responses
	(N=78)
Literacy	39
Women's Relief	20
Maendeleo Ya Wanawake	10
Cooperative	10
Community Development	9
Church	9
Domestic Science	1
"Y"	1
Construct Roads	1
Total	100

7. Women's Perception of Problems With the Water Supply System

When asked in the follow-up survey if there were any problems with the water supply system, most respondents (90 per cent) said "yes". Most dissatisfaction (54 per cent of the comments) comes from the distance they still have to walk. Another third of the comments concern insufficiency of supply: too little water, storage tank too small and too many users. Also mentioned were broken pipes (9 per cent of the comments) and long periods of waiting at the distribution points (5 per cent of the comments). Recommended improvements mainly deal with increased accessibility - bringing the water nearer to the homes.

Table 19

Perceived Problems And Improvements Recommended For Water System (In Per Cent)

Comments	Problems	Improvements
	(N=55)	(N=52)
Distance too great, bring nearer	57	78
Supply problems		
Too many users	16	-
Storage tank small - need more bigger	9	10
Little water - need bigger pipes	4	10
Pipes break -replace with stronger	9	2
Wait too long	5	-
Total	100%	100%

KATOTHYA

The Setting

Katothya is located in Kitui District, Eastern Province, about 30 miles from Kitui town. The community has approximately 3,000 residents and one primary school. Katothya is located in a low potential agricultural zone. Crops are grown primarily for food. The main subsistence crops are maize, millet, beans, sorgum, green grams, cowpeas, vegetables and cassava. Most repondents in both the "before" and "after" samples reported growing maize, millet, beans and sorghum. The only cash crop grown in the area is caster seeds. Livestock also are sold for cash income.

Prior to the construction of the water project, the community obtained water from the rivers and streams in the area. Residents generally travelled an average of six kms. to collect water. For the past four years, the water system has been under construction, and during the rains, residents have been able to collect water from the rock catchment, an average distance of 2 - 3 kms. from the community. During the dry season, residents have had to collect water from the rivers and streams. The water is usually carried in gourds containing 4 litres of water. Normally two or three gourds are carried each trip in a basket strapped around the carrier's head and carried on the carrier's back.

In 1971, the community formed a self-help water project committee which asked the Ministry of Water Development to explore the feasibility of collecting rainwater from the rocky area behind the primary school. In 1972, the community begun building a wall to form the rock catchment. The catchment was completed in 1976. The gravity main pipes were laid in 1977, and residents began using water from the communal water point in August 1977.

The project consists of a concrete dam built on rocks which collects rainwater from the rocky hills. From the dam, water flows by gravity to the one communal water point at the school. Due to the minimal supply of rainwater in the catchment, the project has been designed to supply only the school and the single communal water point. At present, the community is constructing a water storage facility at the school.

The contributions of the community and various other groups to the water supply system to date are as shown:

Capital Expenditure

	Materials	Labour
1. Community Input		
1.1 Materials for construction of the dam	$853.66	-
1.2 Labour	-	$3,658.54
2. Government of Kenya/District Development Committee		
2.1 Building materials	$7,317.07	-
3. CARE-Kenya		
3.1 Pipes and fillings for the gravity main	$2,242.64	-
Sub-total (direct cost)	$10,413.37	$3,658.54
Overheads		
4. Catholic Mission		
4.1 Design and supervision	-	$500.00
5. CARE-Kenya		
5.1 P and O	-	$1,255.88
Total	$10,413.37	$5,414.42
Total materials and labour	$15,827.79	

The Kitui County Council is responsible for operating and maintaining the scheme; users pay no fees for their water. may also catchment area but only during rains

The baseline survey in Katothya was conducted during February 1977, which is the period between the short and the long rains. The follow-up survey was conducted during October 1977, at the beginning of the short rains. Thus, respondents in the "before" sample were interviewed during a dry period when they were engaged primarily in harvesting. Respondents in the "after" sample were interviewed during a planting season when they also had access to rainwater.

Respondents in both the "before" and "after" samples were small farmers. The average size of farms was 5.2 acres for both samples. The average family size reported by both samples was 7 persons.

1. Overview

At the time of the follow-up survey, a single trip to the communal water point was reported to take, on the average, an hour more than was required for a trip to the rock catchment at the time of the baseline survey - $3\frac{1}{2}$ instead of $2\frac{1}{2}$ hours. This increase seems to reflect a combination of the difficulty of travel during the rainy season and a long wait at the single communal water point.

As a result, at least during the rainy season of the follow-up survey, when alternative sources of water were available, households have reduced the number of trips made to collect water daily. At the dry season of the baseline survey, households generally made either two or three trips to collect water, spending, on the average, a total of six hours per day. Six hours per day to collect water seems to be the upper limit for most households in both the "before" and "after" samples. At the time of the follow-up survey, the households that can make two or even three trips daily without exceeding this limit continue to do so. However, one-third of the households in the "after" sample (as compared to 2 per cent of the

households in the "before" sample) now make only one trip per day which takes an average time of 4¾ hours. It seems that when an extra trip would increase the total time for water collection beyond six hours, households choose to reduce their use of collected water.

The average amount of water being collected each day at the time of the follow-up survey decreased by one-third. Generally, households continue to use collected water for as many different purposes as they did when they were making more trips. They simply use less collected water for each, dividing each load among more different purposes. Because of the availability of rainwater at the time of the follow-up survey, we do not know whether there has been a reduction in the amount of water actually used or simply a reduction in the amount of water collected from the water source for use.

There is a noticeable decrease in the assistance provided by other family members with water collection after installation of the system. Respondents in the "after" sample are spending slightly more time per day collecting water than were respondents in the "before" sample. Thus, to the extent that there has been a decrease in total time spent collecting water as a result of the reduction in number of daily trips, this benefit of saved time has accrued to other family members rather than to the housewife.

2. Time and Trips

At the time of the follow-up survey, respondents reported that a single water trip takes 3½ hours, on the average, as compared to the 2½ hours reported by respondents in the "before" sample. One explanation for the increased length of a trip is the problem of travel during the rainy season, the time of the follow-up survey. In this part of Kenya, rainfall, when it does occur, is torrential, making movement difficult and slow. In addition, the time of a water trip seems to have been lengthened by the long wait at the single communal water point, a difficulty noted by respondents when asked about their problems with the water system.

One effect of this increased time per trip has been to reduce the average number of trips households are making to collect water, at least during the period of the follow-up survey when rainwater also was available for household and animal use. Households in the "after" sample make an average of 1.8 trips per day to the communal water point as compared to the 2.6 trips to the rock catchment made by households in the "before" sample.

Table 1

Average Number Trips and Average Time Per Trip And Per Day Before And After Water System

	Before	After
Average number trips	2.6	1.8
Average time per trip	2 hrs. 38 min.	3 hrs. 30 min.
Average total time per day	6 hrs. 38 min.	5 hrs. 48 min.

At the dry period of the baseline survey, households generally made either two or three trips per day to collect water. Most (66 per cent) made two trips, averaging three hours each and spent an average time of almost six hours daily collecting water. The second largest group (24 per cent), for whom a single trip averaged one-half hour less time, made three trips daily and spent an average total time of $6\frac{1}{4}$ hours.

During the rains, at the time of the follow-up survey, households generally make either two or one trip per day to collect water. Most (58 per cent) continue to make two trips per day which require an average of three hours each and thus still spend the same average total time of six hours per day. The second largest group (30 per cent) now make only one trip which takes an average time of $4\frac{3}{4}$ hours. Only a few households (12 per cent), whose average time per trip is the shortest, make a third trip. The average total time spent daily by these three-trip households is also six hours. It seems that when an extra trip would increase the total time for water collection beyond six hours, most households choose to reduce their number of trips and, at least during the rains, rely on alternative sources of water.

Table 2

Number Of Water Trips Per Day
Before And After Water System (In Per Cent)

Trips	Before	After
1 trip	2	30
2 trips	66	58
3 trips	24	12
4 trips	8	-
Total	100%	100%

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day
Before And After Water System

	Before		After	
	Average Time Per Trip	Average TotalTime Per Day	Average Time Per Trip	Average Total Time Per Day
1 trips	4 hrs. -	5 hrs. -	4 hrs. 45 min.	4 hrs. 45 min.
2 trips	3 hrs. 5 min.	5 hrs. 53 min.	3 hrs. 3 min.	6 hrs. 6 min.
3 trips	2 hrs. 30 min.	6 hrs. 15 min.	2 hrs. 20 min.	6 hrs. -
4 or more trips	2 hrs. 30 min.	13 hrs. 15 min.	-	-

Because of the decrease in the number of trips made each day, the average total time spent daily collecting water at the time of the follow-up survey is about three-quarters of an hour less than the average total time spent daily at the time of the baseline survey. However, six hours is the modal time spent collecting water for slightly over one-third of the households in both samples. In the "after" sample, slightly more households spend less than these six hours and slightly fewer spend more than was the case at the time of the baseline survey.

Table 4

Total Time Per Day For Water Trips
Before And After Water System (In Per Cent)

Total Time Per Day	Before	After
2 hrs.	6	4
3 hrs.	4	6
4 hrs.	16	24
5 hrs.	2	4
6 hrs.	38	36
7 - 8 hrs.	18	16
9 - 10 hrs.	10	10
Over 10 hrs.	6	-
Total	100%	100%

3. Water Use

As shown by the decreased number of trips, there has been a decrease in the average amount of water collected for daily use. Households in the "after" sample were collecting on the average 29 per cent less water from the communal water point than households in the "before" sample were collecting from the rock catchment.

Table 5

Average Total Litres Collected Daily
In Single And Multi-Purpose Trips

	Before	After
Average total litres collected daily	20.9*	14.8
Average total litres collected in single-purpose trips	2.1(10%)	2.6(17%)
Average total litres collected in multi-purpose trips	18.8(90%)	12.2(83%)

* Calculated 1 load = 8 litres

The decrease in the average amount of water collected daily has not changed the way the water is used, except to reduce the number of households that regularly give some of the water that they collect to their animals. What has changed is the amount of collected water available for each of the regular household uses. With the reduction in trips, more loads are being used for four, five and even six purposes. Fewer loads are being used for two or three purposes. We do not know the extent to which families are supplementing collected water with rainwater. Therefore, we do not know whether the increased length of a trip has reduced the amount of water actually in use or simply has reduced the amount of water collected for use.

Table 6

Proportion Of Households Using Water Daily, By Purpose

Purpose	Before	After
Cooking	100%	100%
Drinking	48%	52%
Washing utensils	82%	80%
Washing clothes	64%	66%
Bathing	82%	88%
Animals	34%	18%

Table 7

Daily Water Trips, By Purpose, Before Water System

	Multi-Purpose Trips*				Single-Purpose Trips**	
Purpose	6 Purposes	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	-	-	1	53	50	4
Drinking	-	-	-	20	2	-
Washing utensils	-	-	1	29	19	1
Washing clothes	-	-	1	24	18	1
Bathing	-	-	1	26	23	4
Animals	-	-	-	12	10	3

*A load used for more than one purpose
**A load used for one purpose.

Table 8

Daily Water Trips, By Purpose, After Water System

Purpose	Multi-Purpose Trips*				Single-Purpose Trips**	
	6 Purposes	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	1	2	10	23	29	3
Drinking	1	2	8	12	4	-
Washing utensils	1	2	8	10	16	-
Washing clothes	1	2	6	12	13	2
Bathing	1	2	6	14	13	10
Animals	1	5	3	1	5	1

* A load used for more than one purposes
**A load used for one purpose

4. Time Use

The reduction in average number of water trips per day has made little change in the pattern of time-of-day used for collecting water. With the lengthened average time per trip reported in the follow-up study, fewer trips (14.2 per cent) are being started after 2 p.m. than at the time of the baseline study (24 per cent).

Table 9

Time of Day Water Trips Started
Before And After Water System (In Per Cent)

Time of Day	Per Cent of All Trips Before	After
	(N=125)	(N=91)
4 a.m.	2.4	3.3
5 a.m.	8.0	4.4
6 a.m.	20.8	23.1
7 a.m.	12.8	14.3
8 a.m.	1.6	8.8
9 a.m.	-	3.3
10 a.m.	2.4	6.6
11 a.m.	4.8	-
12 noon	5.6	3.3
1 p.m.	1.6	2.2
2 p.m.	16.0	16.5
3 p.m.	10.4	7.7
4 p.m.	8.8	3.3
5 p.m.	4.0	2.2
6 p.m.	0.8	1.0
Total	100.0%	100.0%

5. Women's Workload

In this community also, there is a decrease in the assistance provided by other household members after installation of the water system. In the "before" sample, 54 per cent of the respondents made all household water trips; in the "after" sample, the percentage increases to 100. Both before and after installation of the water system, collecting water is women's work. Only two of the other household water carriers in the "before" sample were men. In the "after" sample, presumably because of the fewer trips being made, the housewife is expected to (or expects to) manage the trips herself.

Table 10

Household Water Carriers
Before And After Water System (In Per Cent)

Carriers	Households	
	Before	After
Only respondent makes all trips	54	100
Respondent or someone else makes all trips	40	-
Respondent dosen't make all trips	6	-
Total	100%	100%

Table 11

Age And Sex of Other Household Water Carriers
Before And After Water System

Age/Sex	Number Carriers	
	Before	After
Females 20 and over	18	-
Females between 11-19	6	-
Females 10 or under	1	-
Males 20 and over	2	-
Males between 11-19	-	-
Males 10 or under	-	-

Table 12

Average Time Spent By Respondents On Previous Day's Activities Before And After Water System (In Hours and Per Cent)

	Before		After	
Activity	Time	% of Total	Time	% of Total
Collecting water	5 hrs. 9 min.	35%	5 hrs. 49 min.	36%
Cooking	2 hrs. 5 min.	14%	2 hrs. 45 min.	17%
Eating and drinking	59 min.	6%	1 hr. 7 min.	7%
Cleaning: clothes, utensils and house	57 min.	6%	1 hr. 37 min.	10%
Bathing	8 min.	1%	17 min.	2%
Caring for children	32 min.	3%	1 hr. 13 min.	8%
Farming	1 hr. 56 min.	12%	1 hr. 41 min.	11%
Collecting vegetables	4 min.	-*	1 min.	-*
Grinding and freshing	56 min.	6%	18 min.	2%
Chasing monkeys	1 hr. 1 min.	6%	1 min.	-*
Caring for animals	24 min.	3%	10 min.	1%
Milking	17 min.	2%	4 min.	1%
Collecting firewood	38 min.	4%	40 min.	4%
Marketing	4 min.	-*	1 min.	-*
Crafts	1 min.	-*	1 min.	-*
Resting/leisure	18 min.	2%	7 min.	1%
Average length of day	15 hrs. 28 min.	100%	15 hrs. 57 min.	100%

* Less than .5%

When asked about their previous day's activities, respondents in the "after" sample reported spending about 5¾ hours on the average collecting water. This time is a slight increase - about two-thirds of an hour - over the time reported by respondents in the "before" sample. Thus, in this community also, the benefit of the slight reduction in average total time collecting water each day (from 6½ to 5¾ hours) has accrued to other family members rather than to the women we interviewed.

6. Women's Perception of the Benefits of the Water Supply System

In the follow-up survey, respondents were asked what difference the water supply system had made for their children. Of the 47 women with children, all reported that the water system had been of benefit to their children. In the perception of most respondents, the primary benefit has been increased cleanliness of person which accounted for almost half the comments. Another fifth of the comments mention the benefit of saved time - either time saved by children directly or time saved by the mother which in turn benefits the child (e.g. the mother can fetch water more quickly in the morning, so the children are not late to school, or the mother has more time to prepare luch, so the children are better nourished). Almost a tenth of the comments mention improved health as a result of greater cleanliness and sanitation.

Table 13

Benefits To Children Of Water System (In Per Cent)

Comments	Responses
	(N=74)
Cleaner, bathe more often	48
Cleaner clothes, washed more often	11
Look smarter	8
Less illnes	9
Comments involving time: spend more time on schoolwork, not late for school, eat better, no longer fetch water other	23
Other	1
Total	100%

Respondents also were asked how the water supply system had affected them and the other adults in their households. The greatest number of comments deal with saved effort, since it is no longer necessary to climb up and down the steep hill to and from the rock catchment. An additional tenth of the comments mention improved health as a result of the less ardvous trip to collect water. Respondents also comment upon the increases in cleanliness made possible by the water supply system.

Table 14

Benefits To Respondent And Other Adults Of Water System
(In Per Cent)

Comments	Responses
	(N=80)
Cleanliness	
Wash clothes, utensils more	14
Bathe more	14
Improved appearance	1
Personal benefit	
Less walking, no longer climb rocky hill	28
Less tired, health better	9
Can make more trips	3
More time for other activities	
Prepare meals more regularly, better	10
Attend more meetings	4
Visit friends	1
Problems from assisting in construction of water system	
Health problems	14
Not enough farming	2
Total	100%

The final question concerning possible benefits of the water system asked respondents whether, now that they receive water nearer their homes, they had more time to do things that they could not do before. Almost all (90 per cent) answered "yes". Their answers to the probe "what things are you doing now that you could not do before emphasize farming, greater participation in groups and improved hygiene of children.

Table 15

Things Done Now That Were Not Done Before Water System
(In Per Cent)

Comments	Responses
	(N=89)
Farming	
More/improved farming	43
Take better care of animals	5
Improved practices - terracing	5
Milk	1
Household	
Bathe or clean children more of ten, better	16
Wash clothes more of ten	5
Collect firewood	1
Prepare meals more regularly	2
Other	
Attend more meetings, groups	17
Visit friends	2
Market	3
Total	100%

It is possible that these responses represent attempts to make a correct or favourable response. However, it is equally possible that respondents actually perceive the water system as providing these benefits. Clearly, the trip which no longer involves a climb is less difficult. If the lengthened time is due primarily to the rains, this is a temporary and expected situation. Respondents may be indicating their perception of the more usual situation without the rains. Or they may even feel that compared to previous rainy seasons, the water system has made it possible to collect more water with less effort.

In the baseline survey, respondents were asked: "If you had more time, what would you like to do to take care of your home, or your farm, or your children that you cannot do now?" Responses are fairly equally divided between the desire to improve farming, especially to cultivate more or new kinds of vegetables and the desire to improve the home, especially its cleanliness. One-third of the responses mention activities requiring more water, especially bathing children.

Table 16

Household And Agricultural Activities Respondents Want To Undertake If They Have More Time (Asked Before Water System, Only) (In Per Cent)

Comments	Responses
	(N=129)
Farming	
Plant more new vegetables	33
Improved practices - terracing	6
Keep out monkeys from shamba	1
Keep more animals	1
Household	
Spend more time with family	5
Clean home more often/better	9
Clean children more often/better	13
Wash clothes more often/better	4
Bathe	3
Repair clothes	1
Build better house	10
Other	
Attend meetings/educational programmes	12
Market	1
Rest	1
Total	100%

7. Women's Perception of Problems With the Water Supply System

When asked in the follow-up survey if there were any problems with the water supply system, most respondents (96 per cent) said "yes". The major cause of dissatisfaction is the distance (62 per cent of the comments) which may partially reflect the time these respondents are spending on their water trips. The time spent waiting is another, although considerably less frequently-mentioned, source of dissatisfaction. Recommended improvements mainly deal with increased accessibility. One-third of the comments recommend the construction of a storage tank which is being undertaken by the community.

Table 17

Perceived Problems And Improvements Recommended For Water System (In Per Cent)

Comments	Problems	Improvements
	(N=52)	(N=50)
Distance too great/bring nearer	62	68
Waiting in queue for water	21	-
Little water	13	-
Dirty water	2	-
No storage tank	27	30
Should charge for water	-	2
Total	100%	100%

KARWETI

The Setting

Karweti is located in Kiambu District, Central Province, about 20 miles north of Nairobi. The community has approximately 3,918 residents, five schools and two trading centres. Karweti is located in a high potential agricultural zone. Crops are grown for both food and for cash. Subsistence crops include maize, potatoes, beans, sugar cane, arrow roots, sweet potatoes, vegetables and cassava. Crops grown for cash sale include coffee, maize, potatoes and beans. Dairy products and poultry are additional sources of cash income. Most respondents in both the "before" and "after" samples reported growing maize, beans and potatoes; one-third of the respondents in both samples reported growing coffee.

Prior to the construction of the water project, the community obtained water from two rivers in the area. Residents generally traveled an average distance of $\frac{1}{4}$ - $\frac{1}{2}$ km. down steep hills to these water sources and then back up the steep hills with their loads of water. Water usually is carried in a mitungi (22-litre can) on the carrier's back with a strap across the carrier's forehead. Because the ridges of the hills near the rivers are used for farming, eroding soil frequently interfered with the supply of clean water.

In 1968, the community formed a self-help water project committee. Between 1972 and 1974, Phase I of the project was completed. The Ministry of Health provided the present pumping unit and artisans who assisted the community to build the intake weir, a 10,000-gallon masonry tank at the intake and a pump house. The Ministry of Water Development designed the scheme, supervised the laying of the rising main and provided artisans for the construction of a 30,000-gallon storage facility.

In 1975, the community began construction of Phase II of the project which also was designed by the Ministry of Water Development. Construction of Phase II was completed in 1977. Residents began using water piped to their homes slightly over a year ago.

The project consists of an intake on the Karweti River where water is pumped through a rising main to a 30,000-gallon storage tank from which it flows by gravity to the individual homes of 130 community residents.

farm connection? or house connection?

The contributions of the community and various other groups to the water supply system to date are as shown:

Capital Expenditure - Phases I and II

	Materials	Labour
Phase I		
1. Community Input		
1.1 Materials for storage facility and rising main pipes	$7,177	-
1.2 Labour	-	$2,392
2. Government of Kenya/Ministry of Health		
2.1 Pump, engine, sump	$3,349	-
Sub-total (direct cost)	$10,526	$2,392
3. Overheads		
3.1 Ministry of Water Development technicians	-	$1,000
Total	$10,526	$3,392
Phase I - total materials and labour	$13,918	
Phase II		
1. Community Input		
1.1 Piping for distribution lines	$7,325	-
1.2 Labour	-	$2,116
2. CARE-KENYA		
2.1 Piping for distribution lines	$8,225	-
Sub-total (direct cost)	$15,550	$2,116
3. Overheads		
3.1 Ministry of Water Development design and supervision		$1,000
3.2 Community transport		$ 500
Total	$15,500	$3,616
Phase II Total materials and labour	$19,116	
Total Cost - Phases I and II	$33,084	

Each of the 130 homes in the area presently using piped water pay a monthly fee of K.Shs: 10/- to the project committee. This revenue is used to meet the operating and maintenance costs of the water supply system.

The baseline survey in Karweti was conducted during September 1975. Additional baseline information was obtained in June 1976. The original baseline survey was carried out during the dry period between the long and short rains. The follow-up survey was conducted during October 1977, at the beginning of the short rains.

Respondents in both the "before" and "after" samples were small farmers. The average farm size was 4 acres for both samples. The average family size reported by the "after" sample was 7.7 persons. (This question was not asked of the "before" sample).

Households in the "after" sample include households that are receiving water piped directly to their compounds and households that take water from the compound of a neighbour.

1. Overview

In this community, the piped water system has reduced the average time for a single water trip from 1¼ hours to slightly over ¼ hour.

Despite the greatly decreased time required to collect water, the number of times water is collected daily by households in the "after" sample has increased only slightly over the number of water trips made by households in the "before" sample. The average number of daily water collections reported in the follow-up survey is 4.7, as compared to 4.1 trips for water reported in the baseline survey. It is possible that households receiving piped water are using more water than indicated by these reports, either because they are supplementing collected water with rainwater or because they are under-reporting their collection of water. It would seem likely that as the time and effort of collecting water lessens, respondents would tend to overlook some of the times that they or other members of their families collect water. However it also is possible that the amount of water obtained in four water collections is perceived as sufficient for daily needs by a majority of households in this community.

There has been a corresponding increase in the average amount of water collected and used daily. Households in the "after" sample reported collecting twenty per cent more water than households in the "before" sample. Either because of this increase or because they are supplementing collected water with rainwater, more loads of water are used for one purpose or divided between two purposes than was the case before installation of piped water. Similarly, fewer loads are being divided between three purposes. On the basis of the use of water from single purpose trips, it seems that piped water has greatly increased the amount of water used for bathing and for washing clothes at home.

In this community also there is a decrease in the assistance provided by other household members after installation of the piped water system. However, due to the great reduction in the time required to collect water, the women we interviewed after installation spent only 10 per cent of their previous day (1 hr. 28.) on the average collecting water as compared to the women before installation who spent 39 per cent of their previous day (6 hrs. 1 min.) on the average collecting water.

2. Time and Trips

The piped water has reduced the time spent collecting water from an average of 1⅓ hours to an average of slightly over ¼ hour per trip. The total time spent collecting water each day has been reduced from an average of six hours before installation to an average of one and a half hours after installation of the piped water system.

Table 1

Average Number Trips And Average Time Per Trip And Per Day Before And After Water System

	Before	After
Average Number trips	4.1	4.7
Average time per trip	1 hr. 43 min.	19 min.
Average total time per day	6 hrs. 8 min.	1 hr. 27 min.

Thus, two-thirds of the households in the "after" sample are spending less time per day to collect water than was spent by any households in the "before" sample.

Table 2

Total Time Per Day For Water Trips Before And After Water System (In Per Cent)

Total Time Per Day	Before	After
Under 1 hr.	-	18
1 hr. - Under 1½ hrs.	-	30
1½ hrs. - Under 2 hrs.	-	18
2 hrs. - Under 4 hrs.	12	34
4 hrs. - Under 6 hrs.	29	-
6 hrs. - Under 8 hrs.	27	-
8 hrs. - Under 10 hrs.	22	-
10 hrs. and over	10	-
Total	100%	100%

Despite the greatly decreased time required to collect water, the number of times water is collected daily by households in the "after" sample has increased only slightly over the number of daily water collections reported in the follow-up survey is 4.7 as compared to 4.1 trips for water reported in the baseline survey. In both surveys, the modal number of reported trips is four, made by 40 per cent of the households. Before installation, one-third of the households made less and one-third of the households made more than these four trips. After installation, there is an upward shift in the number of daily water trips: only 15 per cent of the households make less and 45 per cent of the households now make more than these four trips per day.

Table 3

Number Water Trips Per Day
Before And After Water System (In Per Cent)

Trips	Before	After
1 trip	2	-
2 trips	6	2
3 trips	21	13
4 trips	41	40
5 trips	16	20
6 trips	12	13
7 trips	2	7
8 trips	-	5
Total	100%	100%

It is possible that there has been a greater increase in the number of times water is collected daily than reported by respondents in the "after" sample. It seems likely that as the time and effort of collecting water lessens, respondents tend to be less accurate in their reporting, overlooking some of the times that they or other members of their families collect water. If this is the case, the total time spent daily to collect water would be similarly under-reported. It also is possible that during the rainy season of the follow-up survey, a majority of households supplemented collected water with rainwater and therefore did not greatly increase their use of piped water. There is the third possibility that the amount of water that was obtained from four water collections is perceived as sufficient for daily needs by a majority of households.

3. Water Use

The increased number of households collecting water more than four times per day after installation of the water system is reflected in an increase in the average amount of water collected and used daily. Households in the "after" sample reported collecting twenty per cent more water than households in the "before" sample.

Table 4

Average Total Litres Collected Daily
In Single And Multi-Purpose Trips

	Before	After
Average total litres collected daily	84.9*	101.3*
Average total litres collected in single-purpose trips	47.1(55%)	60.2(60%)
Average total litres collected in multi-purpose trips	37.8(45%)	41.1(40%)

* Calculated as 1 load = 22 litres

There has been an increase in the proportion of households that regularly use collected water for bathing and washing clothes and a decrease in the proportion of households that report regular use of collected water for drinking.

Table 5

Proportion Of Households Using Water Daily, By Purpose

	Proportion Households	
Purpose	Before	After
Cooking	100%	100%
Drinking	68%	44%
Washing utensils	90%	96%
Washing clothes	48%	84%
Bathing	38%	76%
Animals	96%	86%

Either because of the increase in the amount of collected water or because households are supplementing collected water with rainwater, households in the "after" sample are using more water for each water-related activity. After installation of the piped water system, loads tend to be used for either a single purpose or divided between two purposes. Far fewer loads are divided among three purposes than was the case before installation.

Table 6

Daily Water Trips, By Purpose, Before Water System

Purpose	Multi-Purpose Trips* 3 Purposes	Multi-Purpose Trips* 2 Purposes	Single-Purpose** Trips 1 Purpose
Cooking	34	42	9
Drinking	29	8	-
Washing utensils	24	32	7
Washing clothes	8	8	9
Bathing	8	8	6
Animals	2	6	74

* A load used for more than one purpose

** A load used for one purpose

Table 7

Daily Water Trips, By Purpose, After Water System

Purpose	Multi-Purpose Trips* 3 Purposes	Multi-Purpose Trips* 2 Purposes	Single-Purpose** Trips 1 Purpose
Cooking	6	78	13
Drinking	6	16	-
Washing utensils	3	34	17
Washing clothes	-	17	23
Bathing	6	17	17
Animals	-	10	67

* A load use for more than one purpose

** A load used for one purpose

A comparison of the average amounts of collected water from loads that were used for only one purpose before and after installation of piped water shows increases for all water-related activities, except drinking and animals, and great increases for bathing and washing clothes.

Table 8

Average Litres Water Per Day From Single-Purpose Trips Before And After Water System

Purpose	Before	After
Cooking	4.0	5.7
Drinking	-	-
Washing utensils	3.1	7.5
Washing clothes	4.0	10.1
Bathing	2.7	7.5
Animals	33.2	30.0

* Calculated as 1 load = 22 litres

4. Time Use

In general, more trips for water are being made in the early morning, before 9 a.m. after installation of the piped water system than were made before installation. When little time is required for each trip, households seem to make several mornin trrips in succession in order to obtain most of the water they will need throughout the day.

Table 10

Time Of Day Water Trips Started Before And After Water System (In Per Cent)

Time Of Day	Per Cent of All Trips	
	Before	After
	(N=195)	(N=219)
5 a.m.	-	-
6 a.m.	8%	2%
7 a.m.	10%	19%
8 a.m.	14%	25%
9 a.m.	11%	17%
10 a.m.	14%	6%
11 a.m.	11%	4%
12 noon	4%	4%
1 p.m.	1%	1%
2 p.m.	12%	8%
3 p.m.	5%	4%
4 p.m.	7%	3%
5 p.m.	3%	4%
6 p.m.	-	3%
Total	100%	100%

5. Women's Workload

In this community also there is a decrease in the assistance provided by other household members after installation of the piped water system. In the "before" sample, 73 per cent of the respondents made all household water trips; in the "after" sample, the percentage increases to 90. Both before and after installation, collecting water is women's work; only one of the other household water carriers in the "before" sample was a man. As previously mentioned, it is possible that assistance among the "after" households has been under-reported, due to the ease of access to the piped water.

Table 10

Household Water Carriers
Before And After Water System (In Per Cent)

Carriers	Households	
	Before	After
Only housewife makes all trips	73	90
Housewife or another carrier makes all trips	38	14
Housewife does not make all trips	6	2
Total	100%	100%

Table 11

Ages And Sex of Other Household Water Carriers
Before And After Water System

Age/Sex	Number Carriers	
	Before	After
Females 20 and over	12	2
Females between 11-19	7	2
Females 10 or under	-	-
Males 20 and over	1	-
Males between 11-19	-	-
Males 10 or under	-	-

Because of the great reduction in the time required to collect water, respondents in the "after" sample spent only 10 per cent of their previous day collecting water (1 hr. 28 min.) on the average compared to respondents in the "before" sample who spent 39 per cent of their previous day on water collection (6 hrs. 1 min.) on the average. For women with access to piped water, collection is no longer their single most time-consuming activity. However, without baseline information collected at a comparable agricultural season, it is not possible to determine how women

are spending the extra time that now is available to them.

Table 12

Average Time Spent By Respondents On Previous Day's Activities Before And After Water System (In Hours and Per Cent)

	Before		After	
Activity	Time	% of Total	Time	% of Total
Collecting water	6 hrs. 1 min.	39%	1 hr. 28 min.	10%
Cooking	2 hrs. 24 min.	15%	3 hrs. 15 min.	21%
Eating and drinking	1 hr. 22 min.	9%	1 hr. 17 min.	8%
Cleaning: clothes; utensils and house	1 hr. 16 min.	8%	1 hr. 31 min.	10%
Bathing	1 min.	-*	14 min.	2%
Caring for children	40 min.	4%	58 min.	6%
Farming	1 hr. 10 min.	8%	2 hrs. 36 min.	17%
Collecting vegetables	8 min.	1%	7 min.	1%
Caring for animals	1 hr. 25 min.	9%	1 hr. 39 min.	11%
Milking	41 min.	4%	56 min.	6%
Collecting firewood	6 min.	1%	39 min.	4%
Marketing	8 min.	1%	16 min.	2%
Working outside the home	7 min.	1%	-	-
Resting/leisure	3 min.	-*	13 min.	2%
Average length of day	15 hrs. 32 min.	100%	15 hrs. 9 min.	100%

* = Less than .5%

6. Women's Perception of the Benefits of the Water Supply System

In the follow-up survey, respondents were asked what difference the piped water system had made for their children. All respondents had children, and only two said that the piped water had made no difference. Over half the responses concern increased cleanliness. Thirteen per cent of the comments indicate an awareness of the relationship between increased cleanliness and improved health. Slightly over 20 per cent of the comments are about time - more time for schoolwork, for leisure or for other activities.

Table 13

Benefits To Children Of Water System (In Per Cent)

Comments	Responses
	(N=76)
Cleaner, bathe more often	38
Cleaner clothes, washed more often	16
Look smarter	11
Less illness	13
Comments involving time: spend more time on schoolwork, have more leisure, have more time to help with other activities	22
Total	100%

Respondents also were asked how the water supply system had affected them and the other adults in their households. Less expenditure of energy (less walking, less tired, better health, more leisure) is the primary benefit in the perception of these respondents. To a lesser extent, they also mention increased time for other activities. They make relatively few comments that would indicate increased use of water (i.e. comments involving cleanliness). Three per cent of the comments mention that water carriers are now unemployed.

Table 14

Benefits To Respondent And Other Adults Of Water System (In Per Cent)

Comments	Responses
	(N=72)
Cleanliness	
Wash clothes, utensils more	4
Bathe more	9
Cleaner house	3
Personal benefit	
More free time	33
Less tired, health better	5
More leisure	7
More time for other activities	
Prepare meals more regularly	3
Attend more meetings	5
More farming	3
More marketing	2
Visit friends	3
Can do other things - not specified	9
Better care of animals	
Animals drink more	5
Problems from assisting in construction of water system	
Health problems	3
Not enough farming	3
Unemployment of water carriers	3
Total	100%

The final question concerning possible benefits of the piped water asked respondents whether, now that they receive water near their homes, they had more time to do things that they could not do before. All respondents answered "yes". Their answers to the probe " hat things are you doing now that you could not do before?" emphasize farming and care of animals.

Table 15

Things Done Now That Were Not Done Before Water System
(In Per Cent)

Comments	Responses
	(N=110)
Farming	
More time farming - not specified	41
Take better care of animals/give animals more water	21
Can work on other farms for cash income	1
Household	
Clean home more often, better	6
Wash clothes more often	10
Prepare meals more regularly	2
Bathe children more often	2
Other	
More time for harambee projects	10
More time for marketing	2
Visit friends, relatives	2
Rest more	1
More time for firewood	2
Total	100%

different classification

See table 15, P 36.

In the baseline survey, respondents were asked about their desired use of extra time with the question: "If you had more time, what would you like to do to take care of your home, or your farm, or your children that you cannot do now?" Their answers were almost exclusively concerned with farming and animals or poultry (almost three-quarters of the comments). In comparison, respondents in the "after" sample indicate use of extra time for a greater range of activities.

Table 16

Household And Agricultural Activities Respondents Want To Undertake If They Have More Time (Asked Before Water System, Only) (In Per Cent)

Comments	Responses
	(N=81)
Farming	
Plant more new vegetables	34
Keep more animals/poultry	22
Take better care of animals/give animals more water	2
More time farming - not specified	17
Household	
Clean home more often/better	17
Clean children more often/better	2
Bathe more often	2
Prepare meals more regularly	2
Wash clothes more often	2
Total	100%

7. Women's Perception of the Problems With the Water Supply System

When asked in the follow-up survey if there were any problems with the water supply system, a third of the respondents (35 per cent) said "yes". Most dissatisfaction comes from shortages of water. Recommended improvements mainly deal with increased storage facilities.

Table 17

Perceived Problems And Improvements Recommended For Water System (In Per Cent)

Comments	Problems	Improvements
	(N=32)	(N=38)
Water shortages	69	-
Small storage tank - need larger	23	70
Tap breakages - need more frequent check-up of system	8	7
Intake to be expanded	-	16
More fees for maintenance	-	7
Total	100%	100%

NYABERA

The Setting

Nyabera is located in Kisumu District, Nyanza Province about 15 miles west of Kisumu. The community has approximately 600 residents, two schools, one church and two cattle troughs. Nyabera is located in a medium potential agricultural zone. Crops are grown for food and for cash. Subsistence crops include maize, potatoes, beans, cassava, sweet potatoes, groundnuts, vegetables and bananas. Major cash crops are maize, millet, groundnuts and vegetables. Almost every respondent reported that she grows maize, beans, cassava, vegetables and bananas. Dairy products are an additional source of cash income. There are about 200 cows and 200 small stock in the community.

Prior to the construction of the water project, the community obtained water from a river or from a group of springs in the area. In 1969, the community, assisted by the Ministry of Health, undertook construction of Phase I of the project. This phase was designed to provide the community with three communal water points and piped water for 110 community residents. Because the water project was providing only a few members of the community with piped water, the project committee, with the assistance of the Ministry of Water Development, began construction of Phase II in 1975. Phase II was designed to increase the number of communal water points and individual connections in oder to provide all members of the community with water. The project was designed to collect water from a group of springs behind three concrete weirs (dams) from which the water is diverted to a 5,000-gallon and a 10,000-gallon storage tank. The water is distributed by gravity flow from these tanks through a series of PVC pipes to the communal points and individual connections. When the project is completed there will be an additional five communal water points. The contributions of the community and various other groups to the project to date are as shown.

before after study simulated by comparison between users + non users - see footnote p. 6

Both households that collect water from communal water points and households with piped water are able to have both the benefits of more water and more time. The average total time spent obtaining water is about one-half hour for households with piped water, one and three-quarters hours for households that use communal water points and five and one-half hours for households that collect water from the river.

Users of the water system have a reduced workload, both in terms of a shorter day and more rest at night. They also have more time to devote to almost every activity as a result of the time they save collecting water.

2. Time and Trips

The water supply system reduces the average time for a single water trip from two hours for households that travel to the river to five minutes for households with piped water and about one-half hour for households that collect water from a communal water point. In this community, the result of this reduction is that users of the water system are able to more adequately satisfy their household needs for water, while spending far less time per day than "non-users" on this activity.

Table 1

Average Number Trips And Average Time Per Trip And Per Day For Users And Non-Users Water System

	Users		Non-Users
	Piped	C.W.P.'s	
Average number trips	5.9	4.4	2.9
Average time per trip	5 min.	27 min.	2 hrs. 7 min.
Average total time per day	29 min.	1 hr. 48 min.	5 hrs. 24 min.

If we assume that households in both the "user" and "non-user" groups have the same general water requirements, we can see that non-users are prevented by the length of a single trip from making a sufficient number of trips per day for their water needs. It is the households with piped water that give us an indication of what in this community is perceived as an adequate supply of water. These households spend between 3 and 6 minutes to collect water (average 5 minutes per trip). They report choosing in fairly equal proportions between four daily trips (24 per cent of the sample), six daily trips (18 per cent of the sample) and eight or more trips (27 per cent of the sample). We should bear in mind that these are probably [illegible] since the possibility of under-reporting increases with a decrease in the time and effort of water collection.

An increase in the average length of trip to about one-half hour for users of the communal water points reduces the number of trips made per day. Most of the households using communal water points are choosing to make four daily trips (41 per cent of the sample) or five daily trips (29 per cent of the sample). Households that collect water from the river make either two (34 per cent of the sample), three (28 per cent of the sample) or four (32 per cent of the sample) trips per day for water. It is only those households that can make a single trip in about $1\frac{1}{4}$ hour, on the average, that seem able to choose to make four water trips per day. The other households that require at least two hours for a single trip are forced to limit themselves to either two or three daily trips.

Table 2

Number Water Trips Per Day
For Users And Non-Users Water System (In Per Cent)

	Users		Non-Users
Trips	Piped	C.W.P.'s	
1 trip	-	-	4
2 trips	-	12	34
3 trips	7	6	28
4 trips	24	41	32
5 trips	24	29	2
6 trips	18	6	-
7 trips	-	-	-
8 trips	12	6	-
Over 8 trips	15	-	-
Total	100%	100%	100%

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day, For Users And Non-Users Water System

	Users				Non-Users	
	Piped		C.W.P.'s			
ips	Average Time Per Trip	Average Total Time Per Day	Average Time Per Trip	Average Total Time Per Day	Average Time Per Trip	Average Total Time Per Day
rip	-	-	-	-	4hrs.30min.	4hrs.
rips	-	-	52 min.	1 hr. 45min.	2hrs.43min.	5hrs.25
rips	6 min.	18 min.	30 min.	1 hr. 30min.	2hrs.13min.	6hrs.30
rips	6 min.	26 min.	30 min.	2 hrs. 2min.	1hr.11min.	4hrs.45
rips	4 min.	22 min.	16 min.	1 hr. 20min.	1hr. -	5hrs. -
rips	5 min.	33 min.	30 min.	3 hrs. -	- -	- -
rips	5 min.	40 min.	15 min.	2 hrs. -	- -	- -
r 8 trips	3 min.	37 min.	-		- -	- -

The water supply system enables users to choose the number of daily trips that more adequately meets their needs and also provides them with the benefit of a considerable amount of saved time each day. Households with piped water spend in total per day either under one-half hour (48 per cent of the sample) or between one-half and one hour (48 per cent of the sample) on their many trips. Half the households using communal water points spend between 1-1½ hours in total per day collecting water; the rest spend, in equal proportions, up to five hours per day. Half the households that travel to the river spend a total of five to six hours per day collecting water. No households using communal water point spends as little time per day as do half the households using piped water. Similarly, no household collecting water from the river spends as little time per day as do half the households with communal water points.

Table 4

Total Time Per Day For Water Trips
For Users And Non-Users Water System (In Per Cent)

	Users		Non-Users
	Piped	C.W.P.'s	
Under ½ hour	48	-	-
½ hr. - Under 1 hr.	48	5	-
1 hr. - Under 1½ hrs.	4	47	-
1½hrs.- Under 2 hrs.	-	12	8
2 hrs.- Under 3 hrs.	-	12	-
3 hrs.- Under 4 hrs.	-	12	26
4 hrs.- Under 5 hrs.	-	12	2
5 hrs.- Under 6 hrs.	-	-	48
6 hrs. and over	-	-	16
	Total	100%	100%

3. Water Use

As shown by the number of trips that they make per day, users of the water supply system are able to collect greater quantities of water for household and animal use. Households using piped water are collecting on the average twenty-five per cent more water each day than households using communal water points, and twice as much water as households that travel to the river.

Table 5

Average Total Litres Collected Daily
In Single And Multi-Purpose Trips
By Users And Non-Users Water System

	Users		Non-Users
	Piped	C.W.P.'s	
Average total litres collected daily	102.9*	81.7	50.21
Average total litres collected in single purpose trips	83.2(81%)	45.0(55%)	19.26(38%)
Average total litres collected in multi-purpose trips	19.7(19%)	36.7(45%)	30.95(62%)

* Calculated as 1 load = 18 litres

Households with piped water are able to use water for more different purposes each day and alsc to use more water for each water - related purpose, or need, than are households that use communal water points and households that collect water from the river. The one seeming exception is water used for drinking and/or making tea. However, the reports in other communities as well as this community seem to support the interpretation that as the distance to the water sourse decreases, respondents tend to under-report use of water for drinking. It becomes more common place and therefore more frequently overlooked.

Table 6

Proportion Of Households Using Water Daily, By Purpose

	Proportion Households		
	Users		Non-Users
	Piped	C.W.P.'s	
Cooking	100%	100%	100%
Drinking	66%	76%	98%
Washing utensils	100%	100%	96%
Washing clothes	85%	82%	40%
Cleaning - not specified	12%	-	2%
Bathing	91%	82%	58%
Animals	66%	41%	36%
Crops	9%	5%	-

Households with piped water can use most of the loads of water that they collect for a single purpose. Most multi-purpose loads are divided among only two purposes, and no loads are divided among more than three purposes. In contrast, households that collect water from the river use only a third of the water that they collect in single-purpose loads. Loads are divided between two, three and even four purposes.

Table 7

Daily Water Trips, By Purpose, For Users Of Piped Water***

	Multi-Purpose Trips*			Single-Purpose Trips**
Purpose	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	-	6	24	35
Drinking	-	6	13	27
Washing utensils	-	3	24	27
Washing clothes	-	-	6	44
Cleaning - not specified	-	-	-	6
Bathing	-	8	20	30
Animals	-	-	2	57
Crops	-	-	-	3

* A load used for one purpose

** A load used for more than one purpose

Table 8

Daily Water Trips, By Purpose, For Users Of C.W.P.'s***

	Multi-Purpose Trips*			Single-Purpose Trips***
	4 Purposes	3 Purposes	2 Purpose	1 Purpose
Cooking	1	5	18	9
Drinking	1	3	6	8
Washing utensils	1	6	10	5
Washing clothes	-	-	7	7
Clenaing - not specified	-	-	1	-
Bathing	1	4	7	3
Animals	-	-	3	9
Crops	-	-	-	1

* A load used for one purpose

** A load used for more than one purpose

*** Figures have been corrected as they would be for 50 respondents to allow comparison.

Table 9

Daily Water Trips, By Purpose, For Non-Users Of Piped Water

	Multi-Purpose Trips*			Single-Purpose Trips**
	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	3	18	63	11
Drinking	3	15	23	3
Washing utensils	2	10	37	6
Washing clothes	1	1	12	7
Cleaning - not specified	-	-	2	1
Bathing	3	5	23	-
Animals	-	3	2	14
Crops	-	-	-	-

* A load used for one purpose

** A load used for more than one purpose

A comparison of the water used from single-purpose trips by households with piped water, households using communal water points and households travelling to the river shows clearly the effect of increased accessibility in allowing households to meet their requirements for water.

Table 10

Average Litres Water Per Day From Single-Purpose Trips, Users And Non-Users Water System

	Users		Non-Users
Purpose	Piped	C.W.P.'s	
Cooking	12.6	3.2	3.9
Drinking	9.7	2.9	1.2
Washing utensils	9.7	1.8	2.2
Washing clothes	15.8	2.5	2.5
Cleaning - not specified	2.2	-	0.4
Bathing	10.8	1.1	-
Animals	20.5	3.2	5.1
Crops	1.1	0.4	-

this suggests time can use

4. ~~Time Use~~ timing of trip

There is a slight tendency for users of the water system to make more of their trips in the morning. There is no difference between households with piped water and household using communal water points; consequently both groups are shown together.

Table 11

Time Of Day Water Trips Started By Users And Non-Users Of Water System (In Per Cent)

Time of Day	Users	Non-Users
6 a.m.	9	9
7 a.m.	5	11
8 a.m.	21	15
9 a.m.	14	7
10 a.m.	12	11
11 a.m.	6	5
12 noon	4	4
1 p.m.	4	2
2 p.m.	8	19
3 p.m.	3	7
4 p.m.	6	6
5 p.m.	4	3
6 p.m.	4	1
Total	100%	100%

5. Women's Workload

In this community, the women we intervieved make almost all trips for water. There is no difference between households with piped water, households using communal water points and households that travel to the river.

Table 12

Household Water Carriers
Users And Non-Users Water System (In Per Cent)

Carriers	Users	Non-Users
Only housevife makes all trips	90	92
Housevife or another carrier makes all trips	10	8
Total	100%	100%

Table 13

Ages And Sex Of Other Household Water Carrier Users And Non-Users Water System

Age/Sex	Number Carriers	
	Users	Non-Users
Females 20 and over	2	-
Females between 11-19	3	4
Females under 10	-	-
Males 20 and over	-	-
Males between 11-19	-	-
Males under 10	-	-

The water system gives the "users" a clear benefit in terms of the use of time. When asked about their previous day's activities, "users" report a shorter average day and more time for almost every activity, including rest and leisure. This means that the time saved collecting water allows "users" to undertake more other activities and also to have more rest, both during the day and in sleep at night.

Table 14

Average Time Spent By Respondents On Previous Day's Activities, Users And Non-Users Water System (In Hours And Per Cent)

Activity	Users		Non-Users	
Collecting water	57 min.	6%	5 hrs. 33 min.	38%
Cooking	3 hrs. 5 min.	23%	2 hrs. 46 min.	19%
Eating and drinking	1 hr. 20 min.	9%	1 hr. 19 min.	9%
Cleaning clothes, utensils and house	1 hr. 53 min.	11%	1 hr. 30 min.	10%
Bathing	22 min.	3%	8 min.	1%
Caring for children	39 min.	5%	22 min.	3%
Farming	2 hrs. 32 min.	17%	1 hr. 10 min.	8%
Collecting vegetables	27 min.	3%	13 min.	1%
Caring for animals	36 min.	5%	26 min.	3%
Milking	31 min.	4%	11 min.	1%
Collecting firewood	30 min.	4%	42 min.	5%
Marketing	-		8 min.	1%
Crafts	13 min.	2%	2 min.	-%*
Resting/leisure	43 min.	5%	6 min.	1%
Visiting relatives	13 min.	2%	-	-
Work outside the house	5 min.	1%	-	-
Average length of day	13 hrs. 8 min.	100%	14 hrs. 36 min.	100%

* Less than .5%

6. Women's Perception of the Benefits of the Water Supply System

Users were asked what difference the water supply system had made for their children. All of the 48 women with children said that the system had made a difference. In the perception of most respondents, the primary benefit has been increased cleanliness of person or of clothes which was mentioned in almost three-quarters of the responses. This emphasis fits with the increased use of water for bathing and washing clothes among users of the water system. A fifth of the responses mention improved health as a result of greater cleanliness and sanitation.

Table 15
Benefits To Children Of Water System

Comments	Responses
	(N=92)
Clean, bathe more often	61
Clean clothes, washed more often	12
Look smarter	1
Less illness	21
Comments involving time: Spend more time on School work, not late to school, eat better because of mother's saved time	5
Total	100%

Users also were asked how the water system had affected them and the other adults in their households. Comments are fairly equally divided between mentions of increased cleanliness, mentions of less expenditure of energy, and mentions of increased time for other activities. Responses to the question about activities made possible as a result of the water system follow the same pattern.

Table 16

Benefits To Respondents And Other Adults Of Water System
(In Per Cent)

Comments	Responses
	(N=106)
Cleanliness	
Wash clothes, utensils more	11
Bathe more	15
Improved appearance	2
Personal benefit	
Less walking	14
Less tired, health better	7
Can make more trips	4
More time for other activities	
Prepare meals more regularly, better	8
Attend more meetings	8
Visit friends	1
More farming	13
More leisure	4
Problems from assisting in construction of water system	
Health problems	9
Not enough farming	2
Total	100%

Table 17

Things Done Now That Were Not Done Before Water System
(In Per Cent)

Comments	Responses
	(N=99)
Farming	
More improved farming	32
Take better care of animals	4
Improved practices	4
Milk	1
Household	
Bathe or clean children more often, better	21
Washing clothes more often	18
Collect firewood	1
Prepare meals more regularly	4
Other	
Attend more meetings, groups	13
Visit friends	1
Market	1
Total	100%

In the follow-up survey 90 per cent of the respondents felt they had problems with the water supply system. 54 per cent of the comments expressed dissatisfaction with the long distances still to be walked, while 33 per cent were concerns about insufficient water supply, i.e. too little water, storage tank too small, to many users, too many broken pipes (90%). The major recommendation for improvement is increased accessibility in which the water should be brought nearer home.

Table 18

Perceived Problems And Improvements Recommended For Water System (In Per Cent)

	Problems	Improvements
	(N=38)	(N=36)
Distance too great, bring nearer	17%	16%
Supply problems	10%	10%
Too many users	-	8%
Storage tank small need more bigger	12%	25%
Little water-need bigger pipes	4%	10%
Pipes break replace with stronger	57%	31%
Wait too long	-	-
Total	100%	100%

APPENDIX 1

Appendix 1 presents some of the baseline data for eight additional communities, collected by CARE-Kenya between May and September 1976. These communities are located in seven districts in Central, Western and Rift Valley Provinces.

We include this information to further illustrate the variety in community conditions and individual decisions as households, especially women, balance their needs for water and their needs for time to pursue other activities.

GITARU-KANYARI

Gitaru-Kanyari is located in Kiambu District, Central Province, about 20 miles west of Nairobi. There are 4,800 residents in the community and one primary school, one nursery school and one trading centre. Gitaru-Kanyari is located in a high potential agricultural zone. Crops are grown for food and for cash. Crops grown for subsistence include potatoes, maize, beans, tomatoes, bananas, yams, onions, sweet potatoes, peas and arrowroots. Crops grown for cash sale include coffee, pyrethrum, maize, and poultry. Livestock, poultry and dairy products are additional sources of income. There are approximately 2,700 cows, 3,000 small stock and 15,000 chickens in the community. The average size of farms reported in the baseline survey was 2.5 acres.

At the time of the baseline survey, community residents obtained their water from a small spring and a borehole in the area. The average distance from the community to these water sources is $\frac{1}{4} - \frac{1}{2}$ mile. Water is carried in a mitungi (22 litre can) which is strapped to the carrier's back with a strap around the carrier's head.

The baseline survey was carried out at the beginning of August 1976, during the period between the long and the short rains.

Table 1

Average Number Trips And Average Time Per Trip And Per Day

Average number trips per day	8.2
Average time per trip	34 minutes
Average total time per day	4hrs. 14 minutes

Table 2

Number Water Trips Per Day (In Per Cent)

Number Trips Per Day	Households
2 trips	6
3 trips	4
4 trips	6
5 trips	4
6 trips	10
7 trips	8
8 trips	32
9 trips	2
10 trips	10
12 trips	10
Over 12 trips	8
Total	100%

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day

Number Trips Per Day	Average Time Per Trip	Average Total Time Per Day
2 trips	48 min.	1 hr. 30 min.
3 trips	45 min.	2 hrs. 15 min.
4 trips	40 min.	2 hrs. 40 min.
5 trips	45 min.	3 hrs. 45 min.
6 trips	36 min.	3 hrs. 36 min.
7 trips	45 min.	5 hrs. 15 min.
8 trips	30 min.	4 hrs. -
9 trips	20 min.	3 hrs. -
10 trips	26 min.	4 hrs. 19 min.
12 trips	36 min.	7 hrs. 12 min.
Over 12 trips	24 min.	6 hrs. 52 min.

Table 4

Average Number Trips Per Day, By Time Per Trip (In Per Cent)

Time Per Trip	Average No. Trips Per Day	Households
Under $\frac{1}{2}$ hr.	11.0 trips	24
$\frac{1}{2}$ hr.	8.1 trips	50
Over $\frac{1}{2}$ hr.	6.6 trips	26
		100%

Table 5

Total Time Per Day For Water Trips (In Per Cent)

Total Time Per Day	Households
Under 3 hrs.	26
3 hrs. - Under 4 hrs.	18
4 hrs. - Under 5 hrs.	20
5 hrs. - Under 6 hrs.	8
6 hrs. - Under 7 hrs.	14
7 hrs. - Under 8 hrs.	6
8 hrs. and over	8
Total	100%

Table 6

Average Time Per Trip And Average Number Trips, By Total Time Per Day

Total Time Per Day	Average Time Per Trip	Average No. Trips Per Day
Under 3 hrs.	28 min.	5.5 trips
3 hrs. - Under 4 hrs.	32 min.	6.4 trips
4 hrs. - Under 5 hrs.	31 min.	9.8 trips
5 hrs. - Under 6 hrs.	38 min.	8.8 trips
6 hrs. - Under 7 hrs.	34 min.	12.6 trips
7 hrs. - Under 8 hrs.	50 min.	9.3 trips
8 hrs. and over	55 min.	10.5 trips

Table 7

Household Water Carriers (In Per Cent)

Carriers	Households
Respondent makes all trips	46
Respondent or someone else makes all trips	48
Respondent does not make all trips	6
Total	100%

Table 8

Ages And Sex Of Other Household Water Carriers

Age/Sex	Number Carriers
Females 20 and over	5
Females 11 - 19	25
Females 10 and under	12
Males 20 and over	4
Males 11 - 19	5
Males 10 and under	7

Table 9

Time Of Day Water Trips Started (In Per Cent)

Time of Day	Trips (N=297)
6 a.m.	1
7 a.m.	12
8 a.m.	25
9 a.m.	22
10 a.m.	10
11 a.m.	5
12 noon	1
1 p.m.	1
2 p.m.	8
3 p.m.	4
4 p.m.	5
5 p.m.	6
Total	100%

Table 10

Proportion Of Households Using Water Daily, By Purpose

Purpose	Proportion of Households
Cooking	100%
Drinking	82%
Washing utensils	98%
Washing clothes	36%
Cleaning - not specified	20%
Bathing	76%
Animals	90%
Crops	2%

Table 11

Average Total Litres Collected Daily In Single And Multi-Purpose Trips (In Per Cent)

Average total litres collected daily	151.5*	100%
Average total litres collected in single-purpose trips	85.4	56%
Average total litres collected in multi-purpose trips	66.1	44%

*Calculated as 1 load = 22 litres.

Table 12

Daily Water Trips, By Purpose

Purpose	Multi-Purpose Trips*				Single-Purpose Trips**
	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	-	2	21	57	25
Drinking	-	2	19	50	23
Washing utensils	-	-	16	46	32
Washing clothes	-	1	14	22	17
Cleaning - not specified	-	-	1	4	5
Bathing	-	1	12	33	22
Animals	-	2	10	22	70
Crops	-	-	-	1	-

* A load used for more than one purpose

** A load used for one purpose

Table 13

No. Hours Spent By Respondent Collecting Water Previous Day (In Per Cent)

No. Hours	Respondents
None	6
1 hr. - Under 3 hrs.	34
3 hrs. - Under 4 hrs.	30
4 hrs. - Under 5 hrs.	14
5 hrs. - Under 6 hrs.	8
6 hrs. and over	8
Total	100%

MUTHIGA

Muthiga is located in Kiambu District, Central Province, about 10 miles west of Nairobi. There are 2,000 residents in the community, one nursery school and a planned cattle dip. Muthiga is located in a high potential agricultural zone. Crops are grown for food and for cash. Crops grown for subsistence include maize, beans, potatoes, onions, peas, tomatoes, carrots, bananas, sweet potatoes, cassava and sugar cane. Vegetables also are grown for cash sale. Dairy products, poultry and pigs are additional sources of income. There are approximately 300 grade cows, 1,000 small stock, 20,000 chickens and 1,000 pigs in the community. The average size of farms reported in the baseline survey was 4 acres.

At the time of the baseline survey, community residents obtained their water from the Nairobi river, the only permanent water source in the area. The average distance from the community to the river is $\frac{1}{2}$ - 1 mile. Water is carried in a mitungi (22 litre can) which is strapped to the carrier's back with a strap around the carrier's head.

The baseline survey was carried out at the beginning of August 1976. during the period between the long and the short rains.

Table 1

Average Number Trips And Average Time Per Trip And Per Day

Average number trips per day	7.5
Average time per trip	- 46 minutes
Average total time per day	5 hrs. 22 minutes

Table 2

Number Water Trips Per Day (In Per Cent)

Number Trips Per Day	Households
3 trips	10
4 trips	14
5 trips	10
6 trips	10
7 trips	8
8 trips	12
9 trips	2
10 trips	22
11 trips	-
12 trips	8
Over 12 trips	4
Total	100%

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day

Number Trips Per Day	Average Time Per Trip	Average Total Time Per Day
3 trips	1 hr. -	3 hrs. -
4 trips	1 hr. 13 min.	4 hrs. 51 min.
5 trips	48 min.	4 hrs. -
6 trips	57 min.	5 hrs. 42 min.
7 trips	30 min.	3 hrs. 30 min.
8 trips	25 min.	3 hrs. 20 min.
9 trips	30 min.	4 hrs. 30 min.
10 trips	35 min.	5 hrs. 50 min.
12 trips	1 hr. -	12 hrs. -
Over 12 trips	25 min.	6 hrs. 40 min.

Table 4

Average Number Trips Per Day, By Time Per Trip (In Per Cent)

Time Per Trip	Average No. Trips Per Day	Households
Under $\frac{1}{2}$ hr.	11.2 trips	10
$\frac{1}{2}$ hr. - Under 1 hr.	8.1 trips	48
1 hr. - Under 2 hrs.	6.2 trips	38
2 hrs. and over	4.0 trips	4
	Total	100%

Table 5

Total Time Per Day For Water Trips (In Per Cent)

Total Time Per Day	Households
Under 2 hrs.	2
2 hrs. - Under 3 hrs.	16
3 hrs. - Under 4 hrs.	18
4 hrs. - Under 5 hrs.	16
5 hrs. - Under 6 hrs.	16
6 hrs. - Under 7 hrs.	14
7 hrs. - Under 8 hrs.	4
8 hrs. - Under 9 hrs.	4
Over 9 hrs.	10
Total	100%

Table 6

Average Time Per Trip And Average Number Trips, By Total Time Per Day

Total Time Per Day	Average Time Per Trip	Average No. Trips Per Day
Under 2 hrs.	10 min.	10.0 trips
2 hrs. - Under 3 hrs.	24 min.	6.1 trips
3 hrs. - Under 4 hrs.	47 min.	4.8 trips
4 hrs. - Under 5 hrs.	47 min.	6.9 trips
5 hrs. - Under 6 hrs.	34 min.	9.4 trips
6 hrs. - Under 7 hrs.	54 min.	8.6 trips
7 hrs. - Under 8 hrs.	1 hr. -	9.5 trips
8 hrs. - Under 9 hrs.	2 hrs.-	4.0 trips
9 hrs. and over	1 hr. 12 min.	11.2 trips

Table 7

Household Water Carriers (In Per Cent)

Carriers	Households
No trips	2
Respondent makes all trips	48
Respondent or someone else makes all trips	46
Respondent does not make all trips	4
Total	100%

Table 8

Age And Sex Of Other Household Water Carriers

Age/Sex	Number Carriers
Females 20 and over	7
Females 11 - 19	24
Females 10 and under	2
Males 20 and over	5
Males 11 - 19	11
Males 10 and under	1

Table 9

Time Of Day Water Trips Started (In Per Cent)

Time of Day	Trips
	(N=277)
6 a.m.	1
7 a.m.	11
8 a.m.	16
9 a.m.	16
10 a.m.	12
11 a.m.	7
12 noon	4
1 p.m.	1
2 p.m.	7
3 p.m.	8
4 p.m.	10
5 p.m.	5
6 p.m.	1
7 p.m.	1
Total	100%

Table 10

Proportion Of Households Using Water Daily, By Purpose

Purpose	Proportion of Households
Cooking	98%
Drinking	64%
Washing utensils	84%
Washing clothes	74%
Cleaning - not specified	12%
Bathing	60%
Animals	92%
Crops	2%

Table 11

Average Total Litres Collected Daily In Single And Multi-Purpose Trips (In Per Cent)

Average total litres collected daily	135.3*	100%
Average total litres collected in single-purpose trips	75.2	55%
Average total litres collected in multi-purpose trips	60.1	45%

*Calculated as 1 load = 22 litres.

Table 12

Daily Water Trips, By Purpose

Purpose	Multi-Purpose Trips*				Single-Purpose Trips**
	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	-	7	15	39	20
Drinking	-	2	4	66	14
Washing utensils	-	2	12	47	20
Washing clothes	-	6	4	21	16
Cleaning - not specified	-	1	-	1	6
Bathing	-	3	1	31	27
Animals	-	7	10	23	67
Crops	-	-	-	-	1

* A load used for more than one purpose

** A load used for one purpose

Table 13

No. Hours Spent By Respondent Collecting Water Previous Day (In Per Cent)

No. Hours	Respondents
None	8
Under 2 hrs.	2
2 hrs. - Under 3 hrs.	[illegible]
3 hrs. - Under 4 hrs.	[illegible]
4 hrs. - Under 5 hrs.	12
5 hrs. - Under 6 hrs.	10
6 hrs. - Under 7 hrs.	10
7 hrs. and over	6
Total	100%

RUTHANJI-NJIRUINI

Ruthanji-Njiruini is located in Nyeri District, Central Province, about 10 miles from Nyeri town. There are 9,000 residents in the community and fourteen schools, four cattle dips and five trading centres. Ruthanji-Njiruini is located in a high potential agricultural zone. Crops are grown for food and for cash. Crops grown for subsistence include maize, beans, potatoes, vegetables, napia grass, bananas and other fruits. The major crop grown for cash sale is coffee. Dairy products, livestock and poultry are additional sources of income. There are approximately 7,000 cattle and 25,000 small stock in the community. The average size of farms reported in the baseline survey was 4.4 acres.

At the time of the baseline survey, community residents obtained their water from the Gura river and Gathanji stream. The average distance from the community to these water sources is $\frac{1}{2}$ - 1 mile. Water is carried in a mitungi (22 litre can) which is strapped to the carrier's back with a strap around the carrier's head.

The baseline survey was carried out at the end of July 1976, during the period between the long rains and the short rains. There are 49 respondents in the sample.

Table 1

Average Number Trips And Average Time Per Trip And Per Day

Average number trips per day	4.5
Average time per trip	48 minutes
Average total time per day	3 hrs. 35 minutes

Table 2

Number Water Trips Per Day (In Per Cent)

Number Trips Per Day	Households
2 trips	4
3 trips	25
4 trips	33
5 trips	18
6 trips	8
7 trips	8
Over 7 trips	4
Total	100%

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day

Number Trips Per Day	Average Time Per Trip	Average Total Time Per Day
2 trips	1 hr. -	2 hrs. -
3 trips	49 min.	2 hrs. 27 min.
4 trips	49 min.	3 hrs. 15 min.
5 trips	48 min.	4 hrs. 2 min.
6 trips	35 min.	3 hrs. 30 min.
7 trips	48 min.	5 hrs. 32 min.
Over 7 trips	50 min.	8 hrs. 40 min.

Table 4

Average Number Trips Per Day, By Time Per Trip (In Per Cent)

Time Per Trip	Average No. Trips Per Day	Households
Under 1 hr.	4.8 trips	47
1 hr.	4.3 trips	53
	Total	100%

Table 5

Total Time Per Day For Water Trips (In Per Cent)

Total Time Per Day	Households
Under 2 hrs.	8
2 hrs. - Under 3 hrs.	29
3 hrs. - Under 4 hrs.	23
4 hrs. - Under 5 hrs.	18
5 hrs. - Under 6 hrs.	16
6 hrs. and over	6
Total	100%

Table 6

Average Time Per Trip And Average Number Trips, By Total Time Per Day

Total Time Per Day	Average Time Per Trip	Average No. Trips Per Day
Under 2 hrs.	30 min.	3.0 trips
2 hrs. - Under 3 hrs.	37 min.	4.0 trips
3 hrs. - Under 4 hrs.	50 min.	4.1 trips
4 hrs. - Under 5 hrs.	1 hr. -	4.0 trips
5 hrs. - Under 6 hrs.	55 min.	5.9 trips
6 hrs. and over	1 hr. -	8.3 trips

Table 7

Household Water Carriers (In Per Cent)

Carriers	Households
Respondent makes all trips	67
Respondent or someone else makes all trips	31
Respondent does not make all trips	2
Total	100%

Table 8

Age And Sex Of Other Household Water Carriers

Age/Sex	Number Carriers
Females 20 and over	9
Females 11 - 19	13
Females 10 and under	-
Males 20 and over	-
Males 11 - 19	-
Males 10 and under	-

Table 9

Time Of Day Water Trips Started (In Per Cent)

Time of Day	Trips
	(N=215)
4 a.m.	-*
5 a.m.	1
6 a.m.	12
7 a.m.	10
8 a.m.	13
9 a.m.	16
10 a.m.	11
11 a.m.	5
12 noon	3
1 p.m.	2
2 p.m.	8
3 p.m.	7
4 p.m.	4
5 p.m.	6
6 p.m.	2
Total	100%

*Less than .5%

Table 10

Proportion Of Households Using Water Daily, By Purpose

Purpose	Proportion of Households
Cooking	98%
Drinking	34%
Washing utensils	88%
Washing clothes	38%
Cleaning - not specified	2%
Bathing	44%
Animals	90%
Crops	6%

Table 11

Average Total Litres Collected Daily In Single And Multi-Purpose Trips (In Per Cent)

Average total litres collected daily	92.5*	100%
Average total litres collected in single-purpose trips	34.8	38%
Average total litres collected in multi-purpose trips	57.7	62%

*Calculated as 1 load = 22 litres

Table 12

Daily Water Trips, By Purpose

Purpose	Multi-Purpose Trips*				Single-Purpose Trips**
	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	-	8	29	63	5
Drinking	-	8	16	14	2
Washing utensils	-	2	23	38	16
Washing clothes	-	1	11	10	6
Cleaning - not specified	-	-	-	-	1
Bathing	-	8	17	10	2
Animals	-	4	13	29	40
Crops	-	-	-	-	8

* A load used for more than one purpose

** A load used for one purpose

Table 13

No. Hours Spent By Respondent Collecting Water Previous Day
(In Per Cent)

No. Hours	Respondents
None	2
1 hr. - Under 2 hrs.	14
2 hrs. - Under 3 hrs.	32
3 hrs. - Under 4 hrs.	18
4 hrs. - Under 5 hrs.	18
5 hrs. - Under 6 hrs.	12
6 hrs. and over	4
Total	100%

VAKHUNGU-NANGINA

Vakhungu-Nangina is located in Busia District, Western Province, about 20 miles from Busia town. There are 10,000 residents in the community and one mission, two trading centres and one school. Vakhungu-Nangina is in a high potential agricultural zone. Crops are grown for food and for cash. Crops grown for subsistence include maize, beans, millet, cassava, finger millet, cowpeas, simsim, bananas and sweet potatoes. Crops grown for cash sale include cotton, maize, sunflowers, groundnuts, sugar cane and millet. Livestock and dairy products are additional sources of income. There are approximately 10,000 cows and 25,000 small stock in the community. The average size of farms reported in the baseline survey was 3.6 acres.

At the time of the baseline survey, community residents obtained their water from the Vakhungu river. The average distance from the community to the river is 3 - 5 miles. Water is usually carried in a debe or pot on the carrier's head. The average capacity of this container is estimated as 18 litres.

The baseline survey was carried out early June 1976, at the end the long rains.

Table 1

Average Number Trips And Average Time Per Trip And Per Day

Average number trips per day	2.7
Average time per trip	2 hrs. 15 minutes
Average total time per day	5 hrs. 29 minutes

Table 2

Number Water Trips Per Day (In Per Cent)

Number Trips Per Day	Households
None	2
1 trip	8
2 trips	48
3 trips	20
4 trips	16
Over 4 trips	6
Total	100%

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day

Number Trips Per Day	Average Time Per Trip	Average Total Time Per Day
1 trip	2 hrs. 37 min.	2 hrs. 37 min.
2 trips	2 hrs. 47 min.	5 hrs. 35 min.
3 trips	2 hrs. 12 min.	6 hrs. 36 min.
4 trips	1 hr. 19 min.	5 hrs. 15 min.
Over 4 trips	1 hr. 10 min.	7 hrs. 30 min.

Table 4

Average Number Trips Per Day, By Time Per Trip (In Per Cent)

Time Per Trip	Average No. Trips Per Day	Households
None	-	2
1 hr. - Under 2 hrs.	4.3 trips	24
2 hrs. - Under 3 hrs.	2.4 trips	38
3 hrs. - Under 4 hrs.	2.1 trips	24
4 hrs. and over	2.0 trips	12
	Total	100%

Table 5

Total Time Per Day For Water Trips (In Per Cent)

Total Time Per Day	Households
None	2
2 hrs. - Under 3 hrs.	8
3 hrs. - Under 4 hrs.	6
4 hrs. - Under 5 hrs.	28
5 hrs. - Under 6 hrs.	-
6 hrs. - Under 7 hrs.	28
7 hrs. - Under 8 hrs.	4
8 hrs. - Under 9 hrs.	16
9 hrs and over	8
Total	100

Table 9

Time Of Day Water Trips Started (In Per Cent)

Time of Day	Trips
	(N=128)
4 a.m.	3
5 a.m.	3
6 a.m.	8
7 a.m.	-
8 a.m.	2
9 a.m.	5
10 a.m.	5
11 a.m.	3
12 noon	8
1 p.m.	-
2 p.m.	14
3 p.m.	8
4 p.m.	12
5 p.m.	8
6 p.m.	3
Total	100%

Table 10

Proportion of Households Using Water Daily, By Purpose

Purpose	Proportion of Households
Cooking	98%
Drinking	40%
Washing utensils	92%
Washing clothes	50%
Cleaning - not specified	-
Bathing	94%
Animals	14%
Crops	6%

Table 11

Average Total Litres Collected Daily In Single And Multi-Purpose Trips (In Per Cent)

Average total litres collected daily	47.3*	100%
Average total litres collected in single-purpose trips	6.1	13%
Average total litres collected in multi-purpose trips	41.2	87%

*Calculated as 1 load = 18 litres.

Table 12

Daily Water Trips, By Purpose

Purpose	Multi-Purpose Trips*				Single-Purpose Trips**
	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	1	9	36	38	1
Drinking	-	13	21	22	3
Washing utensils	1	13	27	25	1
Washing clothes	1	7	8	12	-
Cleaning - not specified	-	-	-	-	-
Bathing	1	5	23	25	9
Animals	1	2	2	1	3
Crops	-	1	1	1	-

*A load used for more than one purpose

**A load used for one purpose

Table 13

No. Hours Spent By Respondent Collecting Water Previous Day
(In Per Cent)

No. Hours	Respondents
None	4
1 hr. - Under 3 hrs.	12
3 hrs. - Under 4 hrs.	10
4 hrs. - Under 5 hrs.	24
5 hrs. - Under 6 hrs.	4
6 hrs. - Under 7 hrs.	24
7 hrs. - Under 8 hrs.	8
8 hrs. and over	14
Total	100%

Table 6

Average Time Per Trip And Average Number Trips, By Total Time Per Day

Total Time Per Day	Average Time Per Trip	Average No. Trips Per Day
2 hrs. - Under 3 hrs.	1 hr. 37 min.	1.5 trips
3 hrs. - Under 4 hrs.	2 hrs. 20 min.	1.6 trips
4 hrs. - Under 5 hrs.	1 hr. 38 min.	2.7 trips
5 hrs. - Under 6 hrs.	-	-
6 hrs. - Under 7 hrs.	2 hrs. 28 min.	2.6 trips
7 hrs. - Under 8 hrs.	1 hr. 15 min.	6.0 trips
8 hrs. - Under 9 hrs.	3 hrs. 7 min.	3.3 trips
9 hrs. and over	3 hrs. 45 min.	2.8 trips

Table 7

Household Water Carriers (In Per Cent)

Carriers	Households
No trips	2
Respondent makes all trips	50
Respondent or someone else makes all trips	36
Respondent does not make all trips	12
Total	100%

Table 8

Age And Sex Of Other Household Water Carriers

Age/Sex	Number Carriers
Females 20 and over	2
Females 11 - 19	9
Females 10 and under	11
Males 20 and over	1
Males 11 - 19	2
Males 10 and under	-

BUSHIANGALA

Bushiangala is located in Kakamega District, Western Province, about 20 miles from Kakamega town. There are 4,600 residents in the community and one secondary school, one primary school, one trading centre and one health centre. Bushiangala is located in a high potential agricultural zone. Crops grown for subsistence include maize, millet, groundnuts, beans, vegetables, cowpeas, pigeon peas, cassava, potatoes, finger millet and bananas. Crops grown for cash sale include sugar cane, maize, beans and groundnuts. Livestock and dairy products are additional sources of income. There are approximately 4,000 cows and 3,400 small stock in the community. The average size of farms reported in the baseline survey was 3.5 acres.

At the time of the baseline survey, community residents obtained their water from a small stream in the area, an average distance of 2 - 3 miles from the community. Water is usually carried in a debe or pot on the carrier's head. The average capacity of these containers is estimated as 18 litres.

The baseline survey was carried out early June 1976, at the end of the long rains.

Table 1

Average Number Trips And Average Time Per Trip And Per Day

Average number trips per day	2.9
Average time per trip	1 hr. 23 min.
Average total time per day	3 hrs. 58 min.

Table 2

Number Water Trips Per Day (In Per Cent)

Number Trips Per Day	Households
1 trip	10
2 trips	34
3 trips	30
4 trips	20
5 trips	2
Over 5 trips	4
Total	100%

Table 6

Average Time Per Trip And Average Number Trips, By Total Time Per Day

Total Time Per Day	Average Time Per Trip	Average No. Trips Per Day
1 hr. - Under 2 hrs.	2 hrs. -	1.8 trips
2 hrs. - Under 3 hrs.	1 hr. 10 min.	2.2 trips
3 hrs. - Under 4 hrs.	51 min.	2.1 trips
4 hrs. - Under 5 hrs.	1 hr. 28 min.	3.3 trips
5 hrs. - Under 6 hrs.	1 hr. 54 min.	5.0 trips
6 hrs. - Under 7 hrs.	2 hrs. 5 min.	3.0 trips
7 hrs. and over	2 hrs. -	4.0 trips

Table 7

Household Water Carriers (In Per Cent)

Carriers	Households
Respondent makes all trips	40
Respondent or someone else makes all trips	58
Respondent does not make all trips	2
Total	100%

Table 8

Age And Sex Of Other Household Water Carriers

Age/Sex	Number Carriers
Females 20 and over	6
Females 11 - 19	18
Females 10 and under	8
Males 20 and over	-
Males 11 - 19	2
Males 10 and under	-

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day

Number Trips Per Day	Average Time Per Trip	Average Total Time Per Day
1 trip	2 hrs. -	2 hrs. -
2 trips	1 hr. 30 min.	3 hrs. -
3 trips	1 hr. 22 min.	4 hrs. 6 min.
4 trips	1 hr. 8 min.	4 hrs. 30 min.
5 trips	45 min.	3 hrs. 45 min.
Over 5 trips	35 min.	4 hrs. 20 min.

Table 4

Average Number Trips Per Day, By Time Per Trip (In Per Cent)

Time Per Trip	Average No. Trips Per Day	Households
Under 1 hr.	4.8 trips	16
1 hr. - Under 2 hrs.	2.7 trips	54
2 hrs. - Under 3 hrs.	2.0 trips	28
3 hrs.	1.5 trips	2
	Total	100%

Table 5

Total Time Per Day For Water Trips (In Per Cent)

Total Time Per Day	Households
1 hr. - Under 2 hrs.	8
2 hrs. - Under 3 hrs.	24
3 hrs. - Under 4 hrs.	20
4 hrs. - Under 5 hrs.	28
5 hrs. - Under 6 hrs.	4
6 hrs. - Under 7 hrs.	12
7 hrs. and over	4
Total	100%

Table 9

Time Of Day Water Trips Started (In Per Cent)

Time of Day	Trips
	(N=146)
6 a.m.	16
7 a.m.	19
8 a.m.	10
9 a.m.	4
10 a.m.	2
11 a.m.	3
12 noon	1
1 p.m.	2
2 p.m.	10
3 p.m.	7
4 p.m.	14
5 p.m.	10
6 p.m.	2
Total	100%

Table 10

Proportion Of Households Using Water Daily, By Purpose

Purpose	Proportion of Households
Cooking	100%
Drinking	92%
Washing utensils	88%
Washing clothes	48%
Cleaning - not specified	4%
Bathing	84%
Animals	26%
Crops	2%

Table 11

Average Total Litres Collected Daily In Single And Multi-Purpose Trips (In Per Cent)

Average total litres collected daily	50.2*	100%
Average total litres collected in single purpose trips	7.2	14%
Average total litres collected in multi-purpose trips	43.0	86%

* Calculated as 1 load = 18 litres.

Table 12

Daily Water Trips, By Purpose

Purpose	Multi-Purpose Trips*				Single-Purpose Trips**
	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	1	12	31	32	5
Drinking	2	21	32	23	4
Washing utensils	1	15	32	18	1
Washing clothes	-	5	11	8	2
Cleaning - not specified	-	-	1	1	-
Bathing	1	16	24	23	5
Animals	-	3	8	3	3
Crops	-	-	1	-	-

* A load used for more than one purpose

** A load used for one purpose

Table 13

No. Hours Spent By Respondent Collecting Water Previous Day (In Per Cent)

No. Hours	Respondents
None	2
Under 2 hrs.	14
2 hrs. - Under 3 hrs.	26
3 hrs. - Under 4 hrs.	18
4 hrs. - Under 5 hrs.	30
5 hrs. and over	10
Total	100%

NYALILKIRUK

Nyalilkiruk is located in Baringo District, Rift Valley Province, about 5 miles from Eldama Ravine town. There are 6,000 residents in the area. The community is located in a high potential agricultural zone. Crops are grown for food and for cash. Crops grown for food include maize, beans, potatoes, vegetables, millet, cassava and bananas. Crops grown for cash sale include pyrethrum, maize, beans, potatoes, sunflower seeds and millet. Dairy products, poultry and livestock are additional sources of income. There are approximately 10,000 cows, 3,000 small stock and 10,000 chickens in the community. The average size of farms reported in the baseline survey was 17.5 acres.

At the time of the baseline survey, community residents obtained their water from a river which is an average distance of 3 - 5 miles from the community. To collect water, residents had to walk through a forest over very steep terrain. Water is carried in a pot on the carrier's head. The estimated capacity of a water pot is 18 litres.

The baseline survey was carried in late June 1976 at the end of the long rains.

Table 1

Average Number Trips And Average Time Per Trip And Per Day

Average number trips per day	2.8
Average time per trip	1 hr. 23 min.
Average total time per day	4 hrs. 6 min.

Table 2

Number Water Trips Per Day (In Per Cent)

Number Trips Per Day	Households
1 trip	2
2 trips	18
3 trips	64
4 trips	14
5 trips	-
6 trips	2
Total	100%

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day

Number Trips Per Day	Average Time Per Trip	Average Total Time Per Day
1 trip	2 hrs. -	2 hrs. -
2 trips	1 hr. 31 min.	3 hrs. 3 min.
3 trips	1 hr. 23 min.	4 hrs. 5 min.
4 trips	1 hr. 17 min.	5 hrs. 9 min.
5 trips	-	-
6 trips	30 min.	3 hrs. -

Table 4

Average Number Trips Per Day, By Time Per Trip (In Per Cent)

Time Per Trip	Average No. Trips Per Day	Households
Under 1 hr.	3.7 trips	6
1 hr.	3.1 trips	46
1½ hrs.	2.9 trips	16
2 hrs.	2.7 trips	30
Over 2 hrs.	3.0 trips	2
	Total	100%

Table 5

Total Time Per Day For Water Trips (In Per Cent)

Total Time Per Day	Households
Under 3 hrs.	10
3 hrs. - Under 4 hrs.	34
4 hrs. - Under 5 hrs.	34
5 hrs. - Under 6 hrs.	-
6 hrs. - Under 7 hrs.	16
7 hrs. and over	6
Total	100%

Table 6

Average Time Per Trip And Average Number Trips, By Total Time Per Day

Total Time Per Day	Average Time Per Trip	Average No. Trips Per Day
Under 3 hrs.	57 min.	2.0 trips
3 hrs. - Under 4 hrs.	1 hr. -	3.0 trips
4 hrs. - Under 5 hrs.	1 hr. 35 min.	3.11 trips
5 hrs. - Under 6 hrs.	-	-
6 hrs. - Under 7 hrs.	1 hr. 49 min.	3.0 trips
7 hrs. and over	2 hrs. 20 min.	3.7 trips

Table 7

Household Water Carriers (In Per Cent)

Carriers	Households
Respondent makes all trips	54
Respondent or someone else makes all trips	42
Respondent does not make all trips	4
	100%

Table 8

Age And Sex Of Other Household Water Carriers

Age/Sex	Number Carriers
Females 20 and over	1
Females 11 - 19	23
Females 10 and under	4
Males 20 and over	-
Males 11 - 19	4
Males 10 and under	1

Table 9

Time Of Day Water Trips Started (In Per Cent)

Time of Day	Trips
	(N=147)
5 a.m.	1
6 a.m.	2
7 a.m.	9
8 a.m.	10
9 a.m.	9
10 a.m.	8
11 a.m.	8
12 noon	5
1 p.m.	7
2 p.m.	12
3 p.m.	12
4 p.m.	12
5 p.m.	4
6 p.m.	1
Total	100%

Table 10

Proportion Of Households Using Water Daily, By Purpose

Purpose	Proportion of Households
Cooking	100%
Drinking	84%
Washing utensils	94%
Washing clothes	42%
Cleaning - not specified	2%
Bathing	84%
Animals	30%
Crops	

Table 11

Average Total Litres Collected Daily In Single And Multi-Purpose Trips (In Per Cent)

Average total litres collected daily	50.7*	100%
Average total litres collected in single-purpose trips	17.3	34%
Average total litres collected in multi-purpose trips	46.1	66%

* Calculated as 1 load = 18 litres

Table 12

Daily Water Trips, By Purpose

Purpose	Multi-Purpose Trips*				Single-Purpose Trips**
	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	-	10	42	40	1
Drinking	-	7	22	21	-
Washing utensils	-	10	29	36	8
Washing clothes	-	4	7	6	5
Cleaning - not specified	-	-	1	-	-
Bathing	-	11	26	9	4
Animals	-	1	5	8	4
Crops	-	-	-	-	-

* A load used for more than one purpose

** A load used for one purpose

Table 13

No. Hours Spent By Respondent Collecting Water Previous Day
(In Per Cent)

No. Hours	Respondents
None	2
Under 2 hrs.	6
2 hrs. - Under 3 hrs.	16
3 hrs. - Under 4 hrs.	32
4 hrs. - Under 5 hrs.	24
5 hrs. - Under 6 hrs.	2
6 hrs. - Under 7 hrs.	12
7 hrs. and over	6
Total	100%

KARAS

Karas is located in West Pokot District, Rift Valley Province, about 2 miles east of Kapenguria town. There are 1,500 residents in the community, one primary school and one planned trading centre. Karas is in a medium potential agricultural zone. Crops are grown for food and for cash. Crops grown for subsistence include maize, beans, sugar cane, potatoes, millet, sweet potatoes, peas and onions. Crops grown for cash sale include maize, beans and potatoes. Dairy products and cattle are additional sources of income. There are approximately 3,000 cattle and 4,000 small stock in the community. The average size of farms reported in the baseline survey was 11 acres.

At the time of the baseline survey, community residents obtained their water from the many permanent streams and two small rivers, the Kapenguria and the Apnipua, in the area. The average distance from the community to these water sources is 2-3 miles. Water is carried in gourds or pots, on either the carrier's head or back. The estimated capacity of one container is 4 litres. Usually two containers are filled in one water trip.

The baseline survey was carried out late June 1976, at the end of the long rains.

Table 1

Average Number Trips And Average Time Per Trip And Per Day

Average number trips per day	3.4
Average time per trip	1 hr. -
Average total time per day	3 hrs. 8 min.

Table 2

Number Water Trips Per Day (In Per Cent)

Number Trips Per Day	Households
2 trips	22
3 trips	38
4 trips	28
5 trips	6
6 trips	4
Over 6 trips	2
Total	100%

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day

Number Trips Per Day	Average Time Per Trip	Average Total Time Per Day
2 trips	1 hr. 27 min.	2 hrs. 54 min.
3 trips	58 min.	2 hrs. 55 min.
4 trips	53 min.	3 hrs. 30 min.
5 trips	36 min.	3 hrs. 3 min.
6 trips	35 min.	3 hrs. 30 min.
Over 6 trips	30 min.	4 hrs. -

Table 4

Average Number Trips Per Day, By Time Per Trip (In Per Cent)

Time Per Trip	Average No. Trips Per Day	Households
Under $\frac{1}{2}$ hr.	5.0 trips	6
$\frac{1}{2}$ hr.	3.8 trips	24
1 hr.	3.1 trips	54
2 hrs.	2.6 trips	14
$2\frac{1}{2}$ hrs.	2.0 trips	2
	Total	100%

Table 5

Total Time Per Day For Water Trips (In Per Cent)

Total Time Per Day	Households
1 hr. - Under 2 hrs.	18
2 hrs. - Under 3 hrs.	20
3 hrs. - Under 4 hrs.	24
4 hrs. - Under 5 hrs.	26
5 hrs. - Under 6 hrs.	4
6 hrs. - Under 7 hrs.	6
7 hrs. and over	2
Total	100%

Table 6

Average Time Per Trip And Average Number Trips, By Total Time Per Day

Total Time Per Day	Average Time Per Trip	Average No. Trips Per Day
1 hr. - Under 2 hrs.	25 min.	3.5 trips
2 hrs. - Under 3 hrs.	45 min.	3.1 trips
3 hrs. - Under 4 hrs.	1 hr. -	3.0 trips
4 hrs. - Under 5 hrs.	1 hr. 16 min.	3.7 trips
5 hrs. - Under 6 hrs.	1 hr. 45 min.	3.5 trips
6 hrs. - Under 7 hrs.	50 min	4.0 trips
7 hrs. and over	2 hrs. -	4.0 trips

Table 7

Household Water Carriers (In Per Cent)

Carriers	Households
Respondent makes all trips	42
Respondent or someone else makes all trips	36
Respondent does not make all trips	22
	100%

Table 8

Age And Sex Of Other Household Water Carriers

Age/Sex	Number Carriers
Females 20 and over	10
Females 11 - 19	13
Females 10 and under	6
Males 20 and over	4
Males 11 - 19	2
Males 10 and under	2

Table 9

Time Of Day Water Trips Started (In Per Cent)

Time Of Day	Trips
	(N=161)
6 a.m.	7
7 a.m.	12
8 a.m.	10
9 a.m.	4
10 a.m.	6
11 a.m.	3
12 noon	6
1 p.m.	3
2 p.m.	7
3 p.m.	6
4 p.m.	16
5 p.m.	11
6 p.m.	1
Total	100%

Table 10

Proportion Of Households Using Water Daily, By Purpose

Purpose	Proportion of Households
Cooking	100%
Drinking	84%
Washing utensils	94%
Washing clothes	82%
Cleaning - not specified	14%
Bathing	90%
Animals	14%
Crops	2%

Table 11

Average Total Litres Collected Daily In Single And Multi-Purpose Trips (In Per Cent)

Average total litres collected daily	24.1*	100%
Average total litres collected in single purpose trips	16.3	67%
Average total litres collected in multi-purpose trips	7.8	33%

* Calculated as 1 load = 18 litres.

Table 12

Daily Water Trips, By Purpose

Purpose	Multi-Purpose Trips*				Single-Purpose Trips*
	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	-	10	32	43	3
Drinking	-	10	22	17	1
Washing utensils	1	12	30	27	5
Washing clothes	-	8	16	14	15
Cleaning - not specified	-	-	3	2	1
Bathing	-	8	21	21	8
Animals	-	1	-	2	4
Crops	-	1	1	-	-

* A load used for more than one purpose

** A load used for one purpose

Table 13

No. Hours Spent By Respondent Collecting Water Previous Day
(In Per Cent)

No. Hours	Respondents
None	2
Under 2 hrs.	24
2 hrs. - Under 3 hrs.	20
3 hrs. - Under 4 hrs.	24
4 hrs. - Under 5 hrs.	24
5 hrs. and over	6
Total	100%

MULOT

Mulot is located in Narok District, Rift Valley Province. There are 4,650 residents in the community, one primary school, one trading centre, and proposed health and administrative centres. The community is in a low potential agricultural zone. Crops are grown primarily for food and include maize, beans, potatoes and vegetables. Because the community is in a dry area, the major source of cash income is the sale of livestock. There are approximately 80,000 cattle and small stock in the community. The average size of farms reported in the baseline survey was 3.8 acres

At the time of the baseline survey, community residents obtained their water from the river Mara. The average distance from the community to the river is 4 - 5 miles. Water is carried in a variety of containers - gourds, pots or debes. It is estimated that on the average 10 litres of water are obtained in a single trip. However, it should be noted that unlike areas where one type of container is generally used, there the range can be as low as 4 litres and as high as 18 litres.

The baseline survey was carried out early June 1976, during the long rains.

Table 1

Average Number trips And Average Time Per Trip And Per Day

Average number trips per day	2.8
Average time per trip	1 hr.
Average total time per day	2 hrs. 29 min.

Table 2

Number Water Trips Per Day (In Per Cent)

Number Trips Per Day	Households
1 trip	8
2 trips	44
3 trips	18
4 trips	22
5 trips	4
6 trips	4
Total	100%

Table 6

Average Time Per Trip And Average Number Trips, By Total Time Per Day

Total Time Per Day	Average Time Per Trip	Average No. Trips Per Day
Under 1 hr.	15 min.	2.5 trips
1 hr. - Under 2 hrs.	27 min.	2.8 trips
2 hrs. - Under 3 hrs.	56 min.	1.7 trips
3 hrs. - Under 4 hrs.	1 hr. 24 min.	2.5 trips
4 hrs. - Under 5 hrs.	1 hr. 27 min.	3.5 trips
5 hrs. and over	1 hr. 20 min.	4.0 trips

Table 7

Household Water Carriers (In Per Cent)

Carriers	Households
Respondent makes all trips	56
Respondent or someone else makes all trips	42
Respondent does not make all trips	2
	100%

Table 8

Age And Sex Of Other Household Water Carriers

Age/Sex	Number Carriers
Females 20 and over	3
Females 11 - 19	15
Females 10 and under	5
Males 20 and over	-
Males 11 - 19	2
Males 10 and under	-

Table 3

Average Time Per Trip And Per Day, By Number Trips Per Day

Number Trips Per Day	Average Time Per Trip	Average Time Per Day
1 trip	2 hrs. 19 min.	2 hrs. 19 min.
2 trips	59 min.	1 hr. 57 min.
3 trips	48 min.	2 hrs. 25 min.
4 trips	50 min.	3 hrs. 22 min.
5 trips	45 min.	3 hrs. 45 min.
6 trips	27 min.	2 hrs. 45 min.

Table 4

Average Number Trips Per Day, By Time Per Trip (In Per Cent)

Time Per Trip	Average No. Trips Per Day	Households
Under 1 hr.	3.2 trips	36
1 hr. - Under 2 hrs.	2.7 trips	52
2 hrs. and over	1.6	12
	Total	100%

Table 5

Total Time Per Day For Water Trips (In Per Cent)

Total Time Per Day	Households
Under 1 hr.	8
1 hr. - Under 2 hrs.	18
2 hrs. - Under 3 hrs.	36
3 hrs. - Under 4 hrs.	12
4 hrs. - Under 5 hrs.	20
5 hrs. and over	6
Total	100%

Table 9

Time Of Day Water Trips Started (In Per Cent)

Time of Day	Trips
	(N=141)
5 a.m.	1
6 a.m.	4
7 a.m.	20
8 a.m.	13
9 a.m.	5
10 a.m.	6
11 a.m.	4
12 noon	2
1 p.m.	1
2 p.m.	15
3 p.m.	4
4 p.m.	11
5 p.m.	8
6 p.m.	5
7 p.m.	1
Total	100%

Table 10

Proportion Of Households Using Water Daily, By Purpose

Purpose	Proportion of Households
Cooking	100%
[illegible]g	78%
Washing utensils	100%
Washing clothes	36%
Bathing	90%
Cleaning - not specified	10%
Animals	10%
Crops	2%

Table 11

Average Total Litres Collected Daily In Single And Multi-Purpose Trips (In Per Cent)

Average total litres collected daily	26.22 *	100%
Average total litres collected in single-purpose trips	3.0	11%
Average total litres collected in multi-purpose trips	23.22	89%

* Calculated as 1 load = 10 litres

Table 12

Daily Water Trips, By Purpose

Purpose	Multi-Purpose Trips*				Single-Purpose Trips**
	5 Purposes	4 Purposes	3 Purposes	2 Purposes	1 Purpose
Cooking	-	6	42	44	5
Drinking	-	3	29	15	3
Washing utensils	-	4	35	30	2
Washing clothes	-	2	10	10	2
Cleaning - not specified	-	-	2	2	1
Bathing	-	5	28	19	1
Animals	-	-	2	2	1
Crops	-	-	-	1	-

* A load used for more than one purpose

** A load used for one purpose

Table 13

No. Hours Spent By Respondent Collecting Water, Previous Day
(In Per Cent)

No. Hours	Respondents
None	2
Under 1 hr.	10
1 hr.	9
1 hr. - Under 2 hrs.	16
2 hrs. - Under 3 hrs.	36
3 hrs. - Under 4 hrs.	10
4 hrs. - Under 5 hrs.	16
Over 5 hrs.	2
Total	100%

APPENDIX 2 - BASELINE QUESTIONNAIRE

KENYA WATER PROJECT WOMEN'S SURVEY

Project PCN _____

Project Name _____

District and Province _____

Date of Visit _____

1. Of the people who are now living and eating together with you:

1.1 How many are babies and children under 6? _____

1.2 How many are boys between 6 and 16? _____

1.3 How many are girls between 6 and 16? _____

1.4. How many are men over 16? _____

1.5 How many are women over 16? _____

2. Each day, how many trips in all are made for water for your household?

_____Total trips

2.1. How long does each trip take? _____total time in hours.

(One trip is going to fetch the water, getting it, and returning home)

	Time of day?	Who Goes?	How is This Water Used
2.2. First Trip			
2.3. Second Trip			
2.4. Third Trip			
2.5. Additional Trips			

3. Yesterday, what time did you get up?

What did you do first after you got up? How long did it take you? were you doing anything else at the same time? What?

What did you do next? how long did it take you? were you doing anything else at the same time? What?

What time did you go to bed?

(If not mentioned check for cooking, cleaning, caring for children, caring for animals, farming, carrying firewood, handicrafts)

Time Period	Activities

(If respondent mentions any activity outside the home farm, ask how often she does this activity and record. Find out what she does in the home and farm when not doing this activity and record in parentheses)

4. Do you usually ha ve time for resting? Yes_____No_____

IF YES: How much time each day? _____hours

5. How large is your farm? _____acres

5.1. What crops do you work on? _____

5.2. Which of these jobs do you do?

	How often?	Hours per Day?
Weeding		
Marketing & Selling		
Milking		
Collecting Eggs		
Caring for Animals & Poultry (Grazing, feeding, taking to dips)		
Collecting and Carrying Firewood		
Making Animal & Dairy Products		
Other Jobs		

6. During this last week (past seven days) have you or anyone in your household had any stomach illness or diahorrea? Yes_____No_____

IF YES: Who?_____

_____

(List by sex and age: M-10, F-21, etc.)

Did they visit a clinic or health centre? Yes_____ No____

IF YES: Who?_____

_____

(List by age and sex)

6.1 Since January, have you or anyone in your household had any stomach illness or diahorrea? Yes_____No_____

IF YES:

List		Length	Medical Treatment	
Sex	Age	Days	Yes	No

(after each illness, probe with: Did_____have stomach illness again after that. Record each time sperately)

7. During this last week (past seven days) have you or anyone in your household had scabies or any other skin or scalp problem?
Yes_____ No_____

IF YES: Who?_____

(List by sex and age: M-10, F-21, etc.) Did they visit a clinic or health centre? Yes_____ No:_____

IF YES: Who?_____

(List by age and sex)

7.1 Since January, have you or anyone in your household had scabies or any other skin or scalp problems? Yes_____ No_____

IF YES:

No		Length	Medical Treatment	
Sex	Age	Days	Yes	No

(After each illness, probe with: Did_____ Have scabies or skin problems again after that?)

8. I am going to ask you about what you do with groups and committees:

8.1 Are you a member of a women's group or a cooperative?
Yes_____ No_____

IF YES: Which?_____
How often do you go to meetings? Times_____
Per_____
How much times doe each meeting take you?_____

How often do you work on farming, roofing, harvesting or other projects for this group? Times_____Per_____
Hours_____

How much time do you spend making handicrafts or other things for this group at home? Hours_____ Per_____

8.2 Are you a member of an adult education class? Yes____No_____

IF YES: How often do you go to class? Times_____Per_____

How much time do you spend each time you go to class_____Hours

8.3 Do you work on any Harambee projects? Yes_____ No_____

IF YES: Which Harambee projects have you participated in since January?_____

How many days did you work?_____

How many hours did you work each of these days?

_____

8.4. Do you go to any educational programmes, or meetings run by health, agricultural, or community development officers? Yes_____ No_____

IF YES: Which ones?_____

How often do you go? Times_____ Per_____

How much time do you spend each time you go_____Hours

9. If you had more time, what would you like to do to take care of your home, or your farm, or your children, that you cannot do now?

_____

_____

_____

_____

_____

(Probe with: Anything else?)

10. If you had more time are there any groups, or projects, or classes you would like to join? Yes_____ No_____

IF YES, Which ones? _____

_____

_____

_____

_____

11. Are there any projects, or activities, or programmes you can think of which would help women in this community? Yes_____ No_____

IF YES, Can you tell me about them?_____

_____

_____

_____

_____

4. Do you usually ha ve time for resting? Yes_____No_____

IF YES: How much time each day? _____hours

5. How large is your farm? _____acres

5.1. What crops do you work on? _____

5.2. Which of these jobs do you do?

	How often?	Hours per Day?
Weeding		
Marketing & Selling		
Milking		
Collecting Eggs		
Caring for Animals & Poultry (Grazing, feeding, taking to dips)		
Collecting and Carrying Firewood		
Making Animal & Dairy Products		
Other Jobs		

APPENDIX 2 - FOLLOW-UP QUESTIONNAIRES

KENYA WATER PROJECT WOMEN'S SURVEY

Project PCN _____

Project Name _____

District and Province _____

Date of Visit _____

1. Of the people who are now living and eating together with you:

1.1 How many are babies and children under 6? _____

1.2 How many are boys between 6 and 16? _____

1.3 How many are girls between 6 and 16? _____

1.4. How many are men over 16? _____

1.5 How many are women over 16? _____

2. Each day, how many trips in all are made for water for your household?

_____Total trips

2.1. How long does each trip take? _____total time in hours.

(One trip is going to fetch the water, getting it, and returning home)

	Time of day?	Who Goes?	How is This Water Used
2.2. First Trip			
2.3. Second Trip			
2.4. Third Trip			
2.5. Additional Trips			

3. Yesterday, what time did you get up?

What did you do first after you got up? How long did it take you? were you doing anything else at the same time? What?

What did you do next? how long did it take you? were you doing anything else at the same time? What?

What time did you go to bed?

(If not mentioned check for cooking, cleaning, caring for children, caring for animals, farming, carrying firewood, handicrafts)

Time Period	Activities

(If respondent mentions any activity outside the home farm, ask how often she does this activity and record. Find out what she does in the home and farm when not doing this activity and record in parentheses)