

Getting access to adequate water: community organizing, women and social change in Western Kenya

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This paper presents initial findings from research exploring the influence of community organizing and gender relations on access to water in Western Kenya. Improved access to water promises significant progress in the lives of many of Africa's rural and urban poor, but few rural communities in Africa have been able to self-organize to significantly improve their access to water. This research seeks to illuminate the social conditions, rights and practices that may hinder or facilitate community organization to achieve better access to water. Two particularly intriguing findings emerge: 1) amongst a wide range of social conditions that hinder the founding of water projects is a hint of male anxiety about how women may use time saved from water collection, and 2) in one community where the obstacles to organizing were overcome, and a successful piped water system installed women, were able to use their time saved from water collection to enhance household tea production and establish a group that has generated new income from casual labour and the production and sale of new crops.

Key words: Africa, women, gender, water, time allocation, livelihoods, community organization, collective action

Jessica Roy died in Nairobi in August 2004 after being struck by a car while walking home from work. This paper presents initial findings from her research on community organizing to improve water access in Western Kenya.

Introduction

Improved water access promises significant progress in the life of many. Unsafe and insufficient water means sick children, unhealthy food, infrequent clothes washing, little milk from cows, few vegetables in gardens and sparse fruit on trees. It also means hours and hours spent climbing up and down hills carrying heavy loads. The brunt of this burden of poor health and heavy labour is born by women.

So far, few rural communities in Africa are able to improve their water supplies. The technical means for improving access to water are relatively simple, but the social arrangements are not. Negotiating old, and constructing new, water rights and practices may provide a way forward.

This research seeks to illuminate three aspects of improved water access. The first concerns *water governance*: How do effective water organizations arise and with what participation by users? The second is focused on *water and livelihoods*: How does access to adequate water affect the way that people earn a living and the quality of their lives? The third question relates to *resource rights, gender and equity*: What is the relationship between the water and land rights of men and women and participation in the management, maintenance and use of water systems?

The study was designed to focus on four pairs of sites in Western Kenya. Two pairs of sites are in the upper Nyando River Basin, an important drainage of Lake Victoria. In this basin of 3,500 km² with average annual rainfall between 700 and 1500 mm, there are high levels of poverty, agricultural production is falling and much of the land is severely degraded (Swallow et al., 2001). The other two pairs of sites are in the adjacent Lare Division which has more erratic rainfall and frequent droughts. Communities in Lare Division identify water shortage as a critical problem (ICRA 1997 in Tuitoek et al. 2001). Households in the Nyando Basin say that water management is a primary concern of men, women and children (Swallow, forthcoming).

Two main water technologies are being used in these two areas. *Spring protection* places concrete tanks at the site of natural springs, some of which have pipes to carry water to individual and collective users. *Rainwater harvesting* collects rainwater for year-round use in tanks, ponds and behind small dams. Some individuals in those areas are using other water technologies such as drip irrigation, rooftop catchment, pump irrigation and boreholes.

This paper is organized as follows. First there is a section on the methodological innovations shaping the research. Then there is a large section summarizing early findings from the research. This section starts by describing what we have learned about water collection times, water sources and the very limited role of government in rural water supply. Then, there is a discussion of the obstacles standing in the way of community organizing to improve water supply. From this description of obstacles to organization, we turn to several sections describing cases of effective community organizing. Finally, the last section of this paper seeks to summarize what has been learnt so far.

Methodological innovation

Four noteworthy innovations in research method emerged in this study. These innovations relate to the way that this study was nested into a larger project, the selection and pairing of communities, the interlocked phases of the research, and a method of generalizing from community case studies.

To ensure that findings from this study would complement other research and development in the area, the study was integrated into larger project contexts. Four of the study sites were linked with the Safeguard project being undertaken by ICRAF, Maseno University and IFPRI in the Nyando basin (also see papers by Swallow et al and Onyango et al presented at this symposium), while four other study sites were linked with the SEARNET water harvesting network being led by the Regional Land Management Unit (RELMA) of ICRAF.

To explore and illuminate factors facilitating and hindering successful community organizing, the study identified *paired communities* facing similar opportunities and constraints. One community was identified where the community had been able to adopt water improvement technology. A second community with similar ecological and livelihood conditions was identified where such water improvements had not been adopted. This pairing of communities allows comparison of the process of community organizing in one neighborhood, and decisions not to organize in the other. This method provides some of the insights of control group procedures widely used in epidemiology and natural science experiments.

To uncover social processes, networks, ideologies and constraints, this study proposed *three phases* of research, of which only the first two have been undertaken so far. The first phase concentrates on interviews with key informants, including government agricultural, water and irrigation officers at several levels, chiefs and village elders, and community leaders interested in the areas of study. The second phase of research brings groups of individuals together for discussion. Some groups included women and men, some just women. Some groups included representatives of a range of ages, so that young and old, women and men would be heard. The third phase of the research, which has not yet been undertaken, involves interviews with stratified random samples of households. Alongside household interviews, in this third phase, time allocation studies will be undertaken, using diaries and observation, to estimate how much time each member of the household takes to collect water. Each phase of research is intended to inform the next. So, for example, key interviews in the first phase inform the questions asked in group discussions in the second phase. Issues identified in phase 2 group discussions inform both the questions to be asked in household interviews and the method of stratifying samples (women, men, rich, poor, members, non-members) most likely to be informative.

One of the recurring issues faced by social science research concerns *generalizing* from small samples. Sometimes small, qualitative studies are dismissed as anecdote. Frequently, however, the stories emerging from such case studies provide hypotheses generating larger research programs. In this research, it is intended that case studies of a small number of communities be matched with quantitative surveys allowing the generality of

the findings to be investigated. Thus, for example, the spread of rainwater tanks and spring protection can be investigated using satellite imagery and geo-referenced on-the-ground surveys; hypotheses about the involvement of women in new water associations can be investigated with straightforward questions to a larger sample of communities. In other words, it is intended that small, exploratory case studies be followed by larger surveys establishing the extent of intriguing case study findings.

Early Findings

In this paper we report some preliminary findings from key informant interviews in phase one of the research, and some group interviews of phase two. For the most part these findings are taken directly from Jessica's field notes. Some context for the study of successful community organization is provided by results from the Safeguard project from the same community.

Initial findings illuminate three aspects of rural life. First we have estimates of the time that women and children spend collecting water and description of the water sources they use. Second, there are intriguing insights into the formation of a successful water users association alongside some glimpses of the reasons why such associations may not be formed elsewhere. Third, there are accounts of the positive influence of improved water access on health, livelihood and social conditions.

Water collection: times, conditions and the role of government

Who thinks about water, mostly?: "The women – water collection is their role, their job....Most of my work involves water." (Ngendui group discussion)

In the community of N'atipkong/ Ngendui, women report spending an average of three and a half hours each day collecting water during the dry season and double that (because hillsides are slippery) in the wet season. They used between 40 litres (elderly women) to 100 litres of water each day. Eight women from this community provided estimates of water quantity collected and time taken (Table 1). This suggests weekly water collection times of almost 25 hours in the dry season and nearly 50 in the wet season.

In the community of Kiptagan, where piped water has been introduced, women recall devoting 13 to 22 hours per week collecting 3 to 4 jerry cans of water per day before the water project. "Those who are connected to a piped water system," they reported, "*save an average of 15 hours per week. We can now use this time on economic activities.*"

Children also collect water, particularly at weekends, but they take longer, because they play at the water source, and collect less, 10 litres instead of 20 per trip. Nevertheless, the woman or women of the household have less to fetch when the children collect some.

For comparison, it has previously been reported (World's Women 2000 reporting data from the UN statistical office), that water collection times for villages in Kenya average just over four hours, in the dry season, and two hours in the wet. The same source reports times in the range of four to six hours in Burkina Faso, Botswana and Cote D'Ivoire. Water collection times of 17 hours per week are reported for Senegal and 15 hours for the dry season in Mozambique. Thus, the water collection times reported for Kiptagan (15 hours) and Ngendui (25 to 50 hours) are similar to, or higher than, the highest averages reported for Africa. Preliminary results from the Safeguard household survey from these and other villages indicate much lower amounts of time spent collecting water. Obviously, more detailed analysis and measurement will be needed in future studies.

Lists of springs, rivers and other water sources available to the community, the problems of each water source and how many families use them, emerged from discussions with groups of water users and with the Divisional Agricultural Officer. Amongst problems reported were: contamination by livestock and by fertilizer, rising rates of typhoid from water contamination, soil erosion blocking water sources, and the difficulty of protecting springs on steep slopes.

Table 1. Women's domestic water collection times in the dry season in Ngendui, Nyando Basin

Woman	Quantity (litres/day)	Time (hours per load of 20 litres)	Time (hours/day collecting water)*
1	80	1	4
2	80	0.5	2
3	60	0.5	1.5
4	100	1	5
5	60	1	3
6	100	1	5
7	40	1	2
8	40	1	2
Average	70	-	3.5

Source: (Ngendui mixed group discussion, Aug 17 2004).

We turn now to the role of the government in western Kenya. In the last 15-20 years, there has been little support from government for rural water supply. "We just let them run their own schemes" says the Provincial Water Engineer (Interview, Kisumu, Aug 2 2004). In the last several years, there has been increased government interest in water questions. The Water Act of 2002 seeks to encourage private companies to provide water services. The same engineer reports this, to be happening, with private companies forming rapidly in the urban and peri-urban areas of western Kenya. But these companies are using existing piped water supply systems, and the cost is believed beyond the reach of poor households. So far, private water companies are not reported to be investing in the development of new water systems, nor tackling issues of rural water supply.

So, assistance from government and from recently encouraged private water service providers is very limited. The main route to improved rural water supply lies through community organizations. These water associations are, however, few and of those that are started many fail.

Why water projects are not started and water associations fail

A man at a baraza recently said: "When water is available at home, what will the women do? Go and sleep around?" (Agricultural officer, Nandi Hills August 4 2004)

Although the work involved in collecting water is long and hard, and the health effects of contaminated water severe, most rural communities in Kenya do not establish associations to improve their access to water. Of the two communities reported above, for example, some people in Kiptagan have improved their water access, but the people of Ngendui have not.

The reasons why communities do not form water associations are poorly understood, but the relations between men and women, gender relations, appear to play a significant role. Two reasons arising from gender relations emerged from this study: failure of men to value women's time devoted to water collection, and men's ideas about what women will do with their time if water is piped into the home. In addition to these concerns arising from relations between men and women, two further deterrents to water associations, and the projects they might sponsor, were described: past experience with failed collective action, and lack of land rights.

The pervasive effects on water improvements of the division of women's and men's responsibilities and perceptions were signaled in thoughtful responses from a female agricultural officer in the Nyando Basin. She was asked: "Are the [water association] committee members always men?" And she answered:

Most women wouldn't want this job...They understand that leadership is a male-dominated field. Leading is also taxing, most women have a lot of manual work. They don't have time. But the people who feel the problem of water are the ladies. And the people who have the resources to do something about water, spring protection for example, are the men. [However] Men look only for profitable activities. They are not interested in something like spring protection...It is women's time. (Agricultural officer, Nandi Hills August 4 2004)

Two important issues are raised in this comment. First, there is the division of work and responsibility between men and women. As in many rural areas of the global south, women in the Nyando Basin do the work of water collection but the decision to devote scarce resources to water projects is understood as a male prerogative. In addition, the membership of any water association will likely be overwhelmingly male. Second, this agricultural officer draws our attention to differences in male and female perceptions of what is valuable. Women perceive water collection as an important activity, but men do not. When she says 'men look only for profitable activities. They are not interested in...spring protection...It is women's time,' this means that men value activities which bring in an income, and may not perceive the time that women devote to water collection as an outlay which the household can reduce. The low valuation of women's time, by policy makers as well as by the women's husbands, has frequently been reported elsewhere (for example Cleaver and Elson 1995). So, this finding about gender relations and water reinforces conclusions from other studies.

A second set of reasons why water associations may not be formed comes from a tantalizing brief comment, reported by the same agricultural officer. She reported that a man at a baraza [meeting?] had recently said, "when water is available at home, what will the women do? Go and sleep around?" The baraza subsequently decided not to build a water project. Of 50 people present, only two were women.

Great weight cannot be placed on a brief second hand comment and its possible connection to a community's decision not to embark upon water improvement. Nevertheless, the importance of ideas about gender and sexuality in the history of social change in the industrialized countries, and the intertwining of gender relations and access to water in most of the global south, provide an informative background to this passing comment.

Widely spread ideas about the domestic role of women, summarized in the saying 'a woman's place is in the home,' are thought to have increased male dominance of women during the industrial revolution in Northwest Europe and North America (Bradley 1996). It is possible that the expression of male fears of women's sexuality, condensed in this comment reported from western Kenya, could be a deterrent to action to improve water. If that is the case, open discussion of the question, and wide reporting of the potential positive outcomes of water projects, might help to defuse such fears.

We turn now from gender relations to indications that inadequate land rights and repeated failures of collective action may deter communities from organizing to improve water supplies and contribute to organizational failure if water associations are established.

In one community discussion, there was a consensus from the community and local government officials that lack of land tenure was a serious obstacle to improving the water supply. A group of men and women in this community was asked, "What prevents you from organizing a water project in your village?" Different community members answered as follows:

We cannot do this because we live on government land. The land is not ours...This is a land tenure problem.

...If we were given this land, even today, we would be ready to [build a water supply system]...

Even though I cannot see, I would be ready to do this today....

This would be the work of the men. The women would assist their husbands...

(Ngendui group discussion, August 16 2004)

Ngendui is a community whose customary rights to land have been taken away by the declaration some decades ago that their land is part of a government forest reserve. For some time, government has been threatening to resettle this community on other land (Divisional Agricultural Officer, Tinderet, August 16 2004). As a consequence, long-term improvements to their water supply are out of the question.

Finally, in this discussion of why communities decide not to organize around water or, if they organize, their efforts do not succeed, there is the issue of the deterrent effect of past failures. The Agriculture Officer in the Nyando Basin whose comments we have previously quoted was asked, 'What leads to failure of community projects?' And she answered:

...poor management, there is no collection of funds, no ability to pay for repairs...In some cases, spring protection may have been done without involving the community...so the community does not feel that they own it. [Some committee members expected that the government would provide money for the project]...Out of all our focal areas, about 40% of the committees are still in place.

...many people become disengaged over time...Poor leadership and past experience still rings a bell in most people's minds...When people hear the term committee, they remember the road committee that failed them, they remember the cattle dip committee that failed them, they remember the health committee that failed them.

(Agricultural officer, Nandi Hills August 4 2004)

So various failures of management and expectations contribute to the failure of more than half of those projects which are started. And past failures of a range of projects contributes to reluctance to embark on another community project.

How a water association and an income generation group started

We turn now from the failure of organizations and reluctance to organize around water to the question of how water associations start when those obstacles have been overcome. This section uses interviews with participants in the Chesilot Project, one of four water improvement projects in the Ketitui/ Kaptagan area of the Nyando Basin, and interviews with members of the parallel women's income generating group that has managed to translate time saved on water collection into income from agricultural produce.

We have several interlocking accounts of the formation of the project. One account is from the Assistant Chief focusing on the negotiations to secure the water source. Then two participants in a group discussion describe the impetus for a water project given to a farming group facing water scarcity, and the progression from raising funds to forming a committee. The final account, from the founding Treasurer of the project explains the importance of the founder's observation of another spring protection scheme at work. First, we hear from the Assistant Chief:

[Organizers of a project] start with my office. They talk. Then they agree with the landowner...The owner must agree to give the water source to the community. The chief himself can come in, he can enforce this. Meanwhile they talk as people who live together. There has never been any real conflict about this. This is a communal agreement. (Assistant Chief, Ketitui/Kaptagan, August 10/04)

Initially, a group of men came together to plant crops. Then there was a time when there was water scarcity. So this group of men decided to start a water project. (Older man, mixed group of Chesilot Project members, Aug 10 04)

Once we'd raised funds and written the constitution, we realized that we needed a committee to manage the funds. The community was in a position to decide who should be committee members. (Discussion with mixed group of Chesilot Project members, Aug 10 04)

In the beginning we were three. We saw a piped, gravity-flow project. We came home and decided to try it. At first we only thought we wanted to bring water near to us. We did not have farming or irrigation in mind. We had livestock in mind. The idea was very popular. More and more people were interested so we decided to form a group...In six months, we already had forty people. We had to refuse other people.

When we were twenty-six, we started a full committee... officials...voting. We were meeting in the evenings and women could not meet because they have work at home.
(Treasurer Reuben and Vice Chairman Koskei of Chesilot Water Project August 6 04)

The formal, government procedures faced by this group sound daunting: "We had to register with the Ministry of Social Services, the Ministry of Water, and the Fisheries Department. Before we started the water project, we had to consult with the Assistant Chief. And then we had to consult Social Services. We had to plan. We had to make a budget. We had to identify a site where we could draw water. We had to consult the owner of the land. Then we had to write a constitution." (Discussion with Chesilot Project members, Aug 10 04)

While there is only one woman participating in the Chesilot water project, the success of this scheme encouraged wives of the male participants to establish a parallel organization supporting women's agriculture and income generation. We shall see in the next section of this paper that this women's group appears to have generated considerable benefits.

A group of participants in the women's income generation project were asked: 'Why did you form the [women's] project?' They answered:

One day we were sitting down over a cup of tea and decided to plan a celebration to thank our husbands for the water project. We wanted to buy them some presents. This was the first time we had sat down as women. Each woman contributed for the tea. This turned into our own group...From here, we decided to build a seed bed and grow the tea seedlings...Then we began to call for meetings every Monday...after two meetings we decided to form a committee.

We had no money initially. But we wanted to earn money. The committee sat down with the members to chart the way forward. We opted for informal harvesting groups, such as tilling the land, weeding, casual labour generally...The men assisted by building the structure for the nurseries...We used money from the casual labor projects.
(Kiptagan women-only group discussion Aug 11, 04)

The ability of the women of this community to turn time savings into money income is particularly intriguing because it provides a response to male undervaluation of women's work and to male fears that women will not use time saved from water collection in a productive manner. More information about this outcome will be provided after the next section, which discusses some of the costs of a water association.

The work and costs of running a water association

The initial costs of water improvements in Kaptagan were relatively small. The group charged a registration fee of K Sh 100. (One dollar buys K Sh 77 in 2004.) Then each member contributed K Sh 700 to cover costs of construction. In addition, the members of the project took out a loan of unknown quantity [does Wilson know?]. Thereafter, each member pays monthly fees of KSh 20 for maintenance of the water system and KSh 40 for costs of meetings.

These fees may, nevertheless, be prohibitive for a large section of the rural community. And new members, with the exception of wives joining by marriage, are being excluded: 'We don't want someone else to come in now and benefit from all we have done without having done the work.'

In the initial construction of the project, members contributed the labor moving and collecting rocks and constructing a footpath to the spring. A mason was employed to construct the concrete tank, and other monies were spent on sand, cement and pipes.

The rules and every day running of the association are described by the Treasurer:

My job is to collect fees, every month. If [users] don't pay, I cut off their water... When pipes break down, we pay the plumber to fix them... sometimes we pay, sometimes the individual does. We also use group labour. If a person breaks something himself, then the committee does not help.

We have a general meeting twice a year. At these meetings, we give the financial records to the whole group. People are reminded of the payments they owe. And they are shown how the money was spent and how much money is remaining.

(Treasurer Reuben and Vice Chairman Koskei of Chesilot Water Project August 6 04)

This Treasurer was also asked, 'why do you think your committee has been able to manage money and maintenance issues so well?':

All the water group members meet every week. We remind them about fees. We have been successful in collecting fees because people are really benefiting from the water. They grow crops, cash crops like tomatoes and kales. They don't want to have the water cut off.

(Treasurer Reuben and Vice Chairman Koskei of Chesilot Water Project August 6 04)

There is a division of labor between men and women in the project. 'Women manage water within the households... [Men are responsible for] any fees or levies. Men take care of vandalism, women report the vandalism. Women also warn children not to play around taps. Plumbing is mainly the domain of men.'

In sum, a comprehensive set of rules, levies, meetings, punishments and exclusions have emerged to administer the project. As the Treasurer and Vice Chairman of the project say, above, the fees and punishments are made less onerous by the fact that the project has enabled households to increase their incomes from casual labour and the sale of agricultural produce. In the next section, we describe some of these benefits.

Productive outcomes of water improvement

Four significant outcomes are reported from community organizing around water in Kaptagan. The first is an improvement in health. The Divisional Agricultural Officer reports that typhoid has been reduced dramatically amongst participants (interview August 16 2004). The second improvement is that women have been freed from some fifteen hours per week of hard labor collecting water. The third improvement, following from this, is that they have organized to use this additional time most remuneratively in selling their labor, growing more crops, diversifying into new products and using the savings to provide credit for new enterprises. Finally, group members report that their lives are generally improved and the cohesion of the community is greater.

The connection between time saved from collecting water and the opportunity to increase agricultural production is not unique to Kaptagan. When a group of people in Ngendui were asked, 'what would women do with their time if there was more water in the home? They answered:

After there is water in the household, the women spend their time in the shamba (farm)... There would be more time for growing crops, especially vegetables. (Ngendui group discussion)

This is how the Assistant Chief in Kaptagan describes the changes in people's lives since the water project:

They have improved since the water project. During the dry season, they used to plant potatoes. They have started keeping livestock; they did not do this before...because of lack of water. They are also now doing horticulture. The economy has grown...

The other people have now started a new water project, because of what they've seen. On a stream across, there is another new project. Kiptagan is the second. A third project started in 2001. And there is a fourth that is very recent.
(Assistant Chief, Ketitui/Kaptagan)

Then, the women of Kiptagan describe how their lives have been changed by increased sale of produce and their formation of a revolving fund:

Our lives have improved.... much for the better. We can undertake irrigation during the drought. We can also sell produce – we are really getting a lot from the sale of farm produce [which goes into the women's group bank account]. The women control this money [and] are at liberty to spend this money in whatever way they feel is right.

Since we formed the association we have a revolving fund. Every Thursday, the women have a meeting in which members ...decide to give the funds to someone. There is no standard amount that members must contribute...We keep track of how much money we collect from each person and of who we give the money to [for school fees, to buy sugar]. We can tell who is next, who has not been given to. The women's group has improved our social cohesion.
[Kiptagan women-only group discussion Aug 11, 04]

The Treasurer of the water project notes that the project has provided most benefits to women because the men are still paying loans incurred for the construction:

The greatest beneficiaries of this project are the women. This is because the men are still repaying the loan they took out to start the project. Once we have fully repaid the loan, then we will be able to do more activities that generate income....Agricultural production has increased generally, so family income for members is also increased. Epidemics such as typhoid have gone down.
[Treasurer and others in mixed group of Chesilot Project members, Aug 10 04]

Broadly comparable improvements are reported from an area of rural India. where water supply has been improved and income-earning opportunities were created (James, et al 2002). The authors of that study come to conclusions that accord well with the experience of Kaptagan: 'When water supply improvements are coupled with opportunity to create income through micro-enterprises, time released from water collection is converted into income earned.'

Notes from a followup visit to Kaptagen – 2 December 2004

A group of researchers and extension workers (Ben Crow, Brent Swallow, Leah Onyango, Wilson Nindo and Daniel Bondotich) returned to Kaptagen on 2 December 2004 to follow up some of the issues emerging from Jessica's earlier interviews and lay the groundwork for additional research in the community. The community welcomed us with uncommon grace and hospitality and spoke with warmth and compassion about Jessica's brief time in their village. Here we share some of the notes from that visit.

The Treasurer and Chair of the Chesilet spring protection group provided more detail about the challenges they encountered in forming the group. The spring that they ended up tapping was their second choice. The local users of their most preferred spring blocked the development. They were fortunate to get permission from the owner of land where their second choice was located. Building the spring head box took several months and major efforts in collecting fees. A year passed by before they had raised enough money to lay the pipes to the 40 homes connected to the water system and at least another year before they raised enough funds to install a holding tank. In all, the system has required the outlay of Ksh 400,000 for materials, plus a large amount of labour. Another insight emerged regarding the reasons for the project. One of the men

acknowledged that he became interested in the water project because he wanted to expand tea production. Tea is labour intensive: by reducing the time needed to collect water, the project freed up time that his wife could then spend on the tea.

The spring protection and piped water project has not been without problems. The system has been vandalized several times, each time requiring expensive repairs. One of the vandalism events occurred just a few days before our visit.

At least two other groups without the same village have also joined together to construct spring protection boxes and piped water systems. A nearby system that has 20 members also reported difficulties in finding a spring that they could use: the women who traditionally used the most common springs were reluctant to permit any construction. They reported a similar level of cost for their water system: Ksh 200,000 for the costs of materials to cover 20 households. This group indicated interesting upstream / downstream interactions, confounded by gender relations. That is, women who live immediately upstream and around springs are the users of well established springs. Men take initiative to develop spring protection and gravity-feed irrigation system, but need to identify a spring significantly upstream from their residences to tap. Water pipes are laid across land that is controlled by men. When water is installed within a household, the women members of their households are the most obvious beneficiaries. The full distribution of benefits within the household depends, however, upon how the women reallocate their saved time.

Intriguing directions for future research

What are the circumstances that lead to spontaneous organizing to improve access to water? Under what conditions does the time saved by women in water collection translate into income generating activities? Answers to these important questions given by rural communities and government officials in western Kenya involve a wide range of variables including:

1. The natural conditions of the area, particularly the location and characteristics of water sources
2. Economic circumstances, such as access to markets and demand for the products which can be produced by the community
3. The history of community organizing, land and water rights, and the availability of basic organizing skills
4. The ability of men and women to negotiate the constraints and opportunities of gendered roles in the community.

This wide range of social and natural variables emphasizes the need for greater understanding of the complex social circumstances in which new technologies are adopted. Many communities in western Kenya have now learned about new technologies of rainwater harvesting and spring protection. Few have been able to adopt them.

The two most intriguing directions suggested by these communities concern the reasons why associations are not started and the circumstances under which women's organizing may emerge. Effective water associations are believed to be few. The reasons for this are poorly-understood, but they may include past experience with failed collective action, failure of men to value women's time devoted to water collection, men's perception that water improvement is a costly activity not generating income, and men's ideas about what women will do with their time.

In a few cases, improved water access is being generated through spontaneous social action. Then, the combination of a (male-dominated) water project and (female-organized) income generation manages to bridge the divide of male and female responsibilities and redress the low valuation of women's time by men. This research is focused on cases of successful rainwater harvesting in Lare District and spring protection in one part of the Nyando river basin. The successful emergence of water user associations in these two areas is associated with some promising economic and social changes.

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