

# RAINDROP

## Rainwater Harvesting Bulletin

May 1991

Vol. 5

### Focus on Kenya

## Demand for Rainwater Harvesting Technology Exceeds Available Resources

By Constance C. Cohen

*The biggest single problem for family or community rainwater harvesting in Kenya is the limited number of adaptable roofs. The second is the lack of money for any other than the most immediate family needs. And the third is not so much the lack of rain as irregular and unreliable rainfall.*

Today, only 21 percent of Kenya's rural population and 61 percent of its urban dwellers have access to safe water, according to World Bank statistics. Moreover, Kenya's water supply problems are growing, driven by the rapidly increasing population and resultant ecological degradation.

However, the common struggle for access to water sources fosters a strong motivation for change, and many Kenyans are interested in improving their water supply with any means available. In the words of one development worker, "Kenyans are 'dead keen' on all methods of harvesting rainwater for use in their homes and for their herds."

One indicator of the level of national interest in rainwater harvesting is that Kenya has 59 RHIC network members, more than any other African country. However,



Commercially-built metal cistern.

there are major obstacles inhibiting wide-scale use of rainwater harvesting in Kenya, although some are being overcome with notable success.

### Thatch and Tamped Earth Roofs Most Common

Roofs made of either thatch or tamped earth are the most common, especially in rural Kenya, but they do not yield rainwater of good quality or quantity. Because thatch is increasingly scarce and costly, more and more Kenyans are obliged to buy corrugated metal roofing materials. One advantage of metal roofing is its suitability for water capture, although locally available corrugated tin is a very thin gauge, despite its being expensive, and it rusts and wears out much sooner than heavy-gauge roofing.

Many of the metal roofs that do exist are so old and rickety that they can not support or be adapted with gutters, and many others are too small to be of much help given the limited annual rainfall.

(continued on page 4)

### Inside This Issue

|                           |   |
|---------------------------|---|
| Low-Cost Roof Tiles       | 3 |
| How to Use RHIC Data Base | 7 |
| Information Resources     | 8 |
| Network News Update       | 9 |
| Conferences               | 9 |

# FROM THE EDITOR'S DESK

## Get the Message and Pass It On

By Carl J. Lindblad

\*\* Rainwater harvesting is a source of potable water. It is a naturally clean and safe source of water. Today contaminated water causes some seventy-five percent of the sicknesses suffered by humans. Each day water-related diseases kill some 30,000 children and adults across this globe. The cycle of water-borne diseases can be broken, and rainwater harvesting is a very powerful tool to do just that.

\*\* Rainwater harvesting is a reliable, low-maintenance, and low-labor source of potable water. Rainwater harvesting is a very practical complement to expand existing water sources, whether drawn from wells, streams, or from overburdened standpipes.

\*\* Where wells are not economically or practically feasible and where other natural ground water sources are distant or seasonal, rainwater harvesting may be the only affordable option to women's arduous daily trek for water. In urban and peri urban areas, rainwater harvesting may be very economical compared to the cost of purchasing water.

\*\* Even where ground water is plentiful during the rainy season, ponds and streams may then be an especially potent source of diseases because fecal-borne and other pathogens accumulated on the land during the dry season are flushed into the surface water sources.

\*\* Community development and grass-roots organization are key to success in promoting rainwater harvesting, as with any water supply projects. Because a rainwater harvesting system is generally simple and uncomplicated to build and maintain, it is well suited to community self-help actions.

\*\* Networking is a low-cost and effective means to share relevant practical information, both successes and failures. Networking reduces the on-site time and cost of trial and error necessary in the development process before any new rainwater harvesting technology can catch on and proliferate.

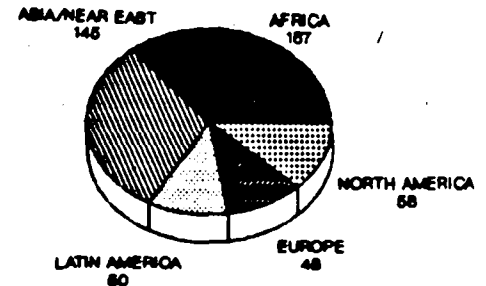
\*\* The more you use RHIC the more useful it will be for you and for the whole Network.

Got the message? Pass it on.

*Carl J. Lindblad has worked for the past eighteen years in a variety of sectors in international development. In addition to rainwater harvesting, his experience includes agricultural extension and training, postharvest food loss reduction, food processing and renewable energy technologies, and small business development.*

## NETWORK MEMBERSHIP UPDATE

### RHIC Network Expanding



Source: RAINCOLL Data Base

The Rainwater Harvesting Information Center (RHIC) is based at the Water and Sanitation for Health Project (WASH) funded by USAID. The RHIC network has a current membership of 468 individuals and institutions from 95 countries, which is a major increase from the initial 74 network members in 1986.

Network members are involved in rainwater harvesting (RWH) activities ranging from both rural and urban community projects to university-based research. You can help the network grow by mailing RHIC the names and addresses of other individuals or organizations who may wish to be members. Thanks!



### **WATER AND SANITATION FOR HEALTH PROJECT**

For additional information about activities and reports highlighted in this issue, contact WASH Operations Center, Room 1001, 1611 North Kent Street, Arlington, VA 22209 USA.

Water and Sanitation for Health Project, Contract No. 5973-7-00-8081, Project No. 836-1249. Sponsored by the Office of Health, Bureau of Science and Technology, U.S. Agency for International Development, Washington, D.C. 20523.

# TECHNOLOGY NEWS

## Women's Coops Manufacture Blocks and Low-Cost Tiles

Like the women from many areas in Africa, the women of Kitui in northwestern Kenya have a reputation for working well in groups. Hundreds of them promptly responded to an opportunity in 1988, when the African Housing Fund (AHF) helped them organize cooperative factories to manufacture roof tiles and blocks for water tanks, houses, and pit latrines. Their products are sold to the local housing industry and they also use them to construct their own homes.

AHF, which is funded by NORAD, the Norwegian aid agency, provides training and support for the management of the manufacturing and sales activities. The trainees then help train others. AHF also provides grants and credit for purchase of land, equipment and start-up materials, and helps arrange sales contacts. Literally millions of tiles have been sold, including roofing tiles for 2,000 new middle-level housing units in Nairobi.

The timing of this concept is good because local government officers are increasingly required to support local enterprise and promote rural small-scale industry. The women have built water harvesting tanks for the district office, a dispensary, and two schools. The main factor limiting community sales is the demand from their own members for block and tiles to build their own homes.

Last year the women built two demonstration houses using hollow cement blocks. Each house had two rooms and a 25m<sup>2</sup> roof. The positive response to the houses was amazing. Not only are the houses attractive, they stay cool, and are very modestly priced; not including labor, they cost Ksh 23,000 (about US\$1,000). The women can also build compacted laterite houses which are even less expensive and bigger, so the roof has greater capability for rain collection.

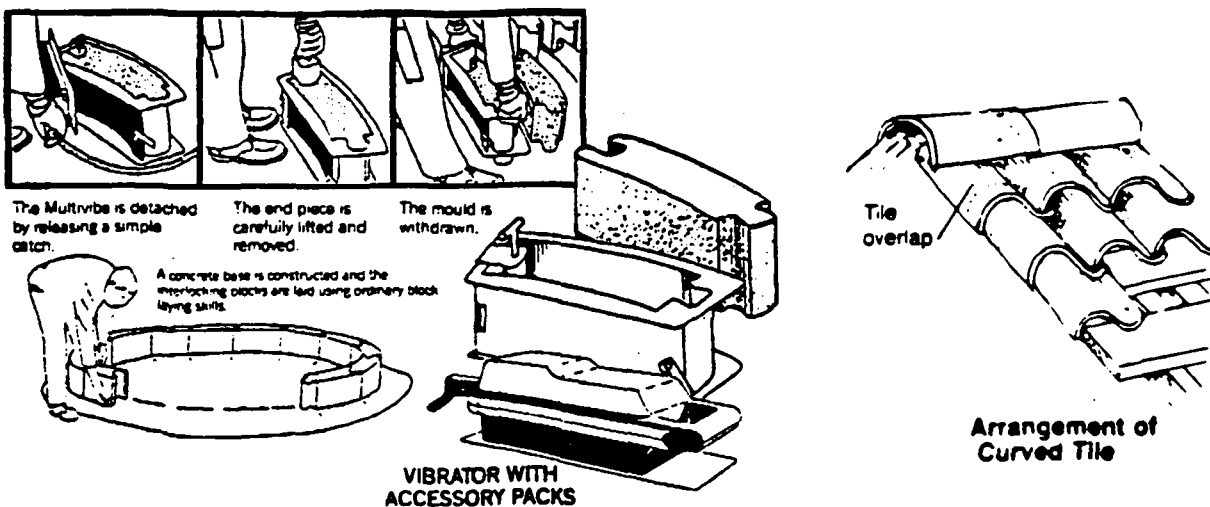
The roofing tiles are thin, light, easy to lay, and have an expected span of durability of 50 years. Their density and strength are assured by the use of a vibrating device, made by Parry Associates, to compact the mortar into the special form. The women also manufacture curved, interlocking solid cement blocks for tank construction and use an award winning tank design also by Parry Associates. Technical assistance is provided by Intermediate Technology Workshops, a Nairobi-based company which also is their major client.

The AHF strategy is also working in slum areas of Nairobi, offering women employment, income—which many never had before, technical training, and self reliance. At first, there were fears that the women would not prove to be a reliable credit risk or strong enough for factory work. This has not been the case.

So far, both the rural and urban projects are success stories, despite initial problems with breakage and transport. Husbands' skepticism and suspicions have been allayed and their support gradually gained. Loans are being repaid on schedule, and the factories are now training other cooperatives from other African countries, including Guinea and Senegal. Spin-offs of this program include community day care centers and carpentry projects for unemployed teenagers.

For more information, including subscription to The AHF Community Builders Bulletin, contact:

African Housing Fund  
P.O. Box 41479  
Nairobi, Kenya



Vibrators and mold systems can be purchased from:

- J.P.M Parry & Assoc. LTD., Overend Road, Cradley Heath, West Midlands B64 7DD U.K.
- Eco Systems Ltd., P.O. Box 938, Balantyre, Malawi.
- Intermediate Technology Workshops, P.O. Box 45156, Nairobi, Kenya.

PO Box 93190, 2509 AD THE HAGUE

Tel.: +31 70 30 689 80

Fax: +31 70 35 899 64

BARCODE: 9633

O:

213.191RA

RAINDROP/May 1991/Page 3

(continued from page 1)

**For the many Kenyans who have practically no disposable income, the cost of sheet metal roofing, gutters, and water harvesting jars is simply out of the question.** Even so, there is broad appreciation for ferrocement water jars of 1,500 to 2,000 liters, and great demand for them. Bigger water jars would be popular except for the cost, which even limits the number of smaller jars.

### Arid Areas and Drought

At least 85 percent of Kenya is arid or semi-arid, receiving just 200-800 mm of rainfall annually. The approximately five million people living in those zones have inadequate water to meet either their household needs or those of the herds on whose welfare their existence depends. Faced with few alternatives, pastoralists, farmers, and villagers have adapted to what the region can provide, at no small cost in health, labor, and comfort.

The average-size Kenyan household needs about 80 liters of water per day, but many families manage daily with just a few liters of water per person. Where families do harvest rainwater, daily rationing is done carefully.

Kenyan families are large and many rural women and children travel on foot up to 30 kilometers round trip every day to get water for cooking, drinking, washing, and their livestock. Because of rapidly increasing population and livestock pressures, Kenya is being rapidly deforested. The subsequent increased runoff speeds soil erosion, reduces conservation of water in natural catchments, and also decreases absorption into the underlying aquifers, compounding the problem.

### High Rainfall Has Its Own Problems

The most densely populated districts are located in parts of central and western Kenya, which receive heavy rainfall once a year. But swollen rivers or water pouring off houses or onto crops do not necessarily solve year-round water supply problems.

In these higher rainfall regions where most people have access to rivers, wells, and springs, many such sources are unprotected and communicate a host of water-borne diseases. In this environment, rainwater harvesting could be a very effective water-supply option, even though surface water may be plentiful.

**When rainwater is used to wash hands and faces, it reduces the incidence of trachoma eye infections commonly transferred by unwashed hand-to-hand-to-eye contact, according to local health workers.**

### Groundwater Often Unhealthy

The extremely high fluoride content of ground water is a health concern in Kenya and other countries of eastern Africa. Overly high fluoride concentration in water, in this case due to volcanic activity, can damage the liver, heart, and bones. In some areas it is 8-12 ppm, compared to the acceptable level of 1 ppm for drinking and cooking.

As this health concern becomes more widely understood, rainwater harvesting may well become much more popular as a source of potable water, even in areas where there is plentiful ground water.

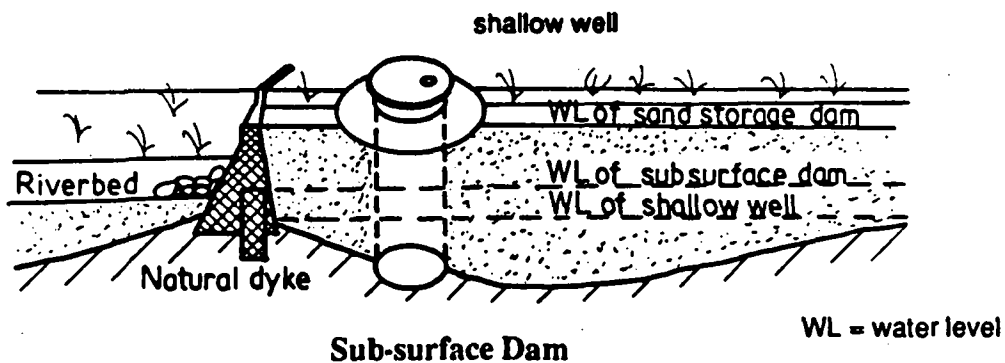
### Ferrocement Most Common Technology

Ferrocement is the most popular tank building material in Kenya because of its strength and relative ease and cost of construction. Mortar-lined granary baskets of about 3,500 liters are also in use. RWH containers vary in size from 1,000-liter jars to tanks up to 80,000 liters. Local builders prefer constructing several smaller tanks rather than a single large tank to avoid overstressing the walls.

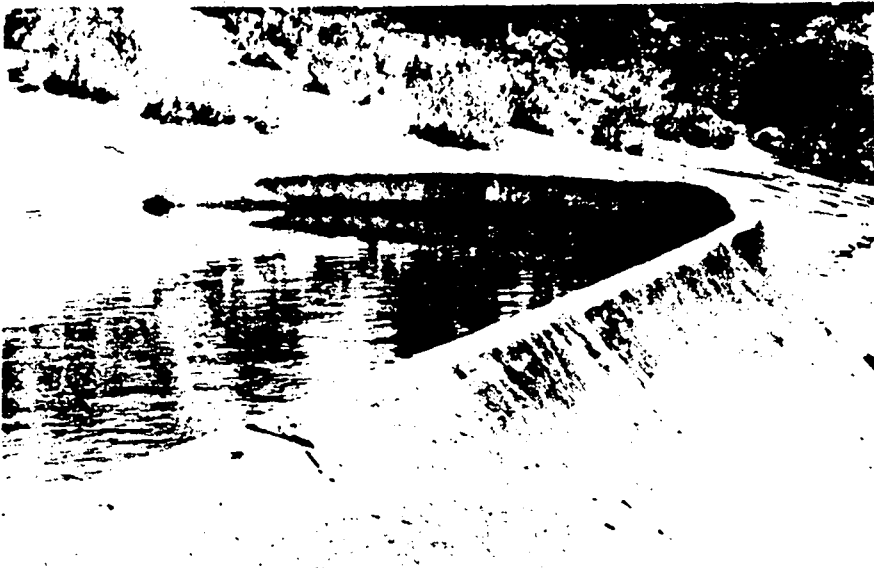
Sub-surface dams and stone-masonry collection pools also have been constructed for rainwater harvesting, especially in the Kitui District. (See diagram below.)

A typical stone-masonry catchment there has about 8,000 cubic meter capacity, and over 100 such catchments have been constructed in the Mutomo Division alone. Building such catchment pools is relatively expensive and

(continued on page 5)



(Drawing from ASAL Rainwater Harvesting, Box 14333, Nairobi, Kenya.)



*A stone-masonry walled catchment tank.*

*(continued from page 5)*

labor intensive, but there are few options where year-round water bearing aquifers are inadequate, deep, or under layers of rock.

One significant disadvantage of RWH systems is that evaporation losses in uncovered water catchments can be as high as 50 percent during 2-3 months of storage. Also, depending on their location, some catchments eventually will become filled with sediment.

Sub-surface dams built across natural drainage areas and stream beds are locally considered the cleanest and most efficient rainwater harvesting option. A number of these dams have been built in both the Machakos and Kitui Districts in the Eastern Province.

### Local Innovation

The cost of gutters can be a major expense in installing a RWH system. *DANIDA technicians in Kenya have devised simple equipment for village-level manufacturing of an improved gutter design. The design is both cheaper and more easily installed than earlier models, requiring simple hangers instead of special gutter mounting brackets.*

The improved design also can handle more roof runoff and significantly reduces splash losses in heavy downpours. The local demand for these gutters now outpaces the supply.

Alternatives to the expense of tin gutters include construction of wooden sluices (in the limited areas where much wood is available), flattened margarine tins, hollow banana stalks, and even large leaves adapted as makeshift rain gutters.

### Government and Donor Assistance

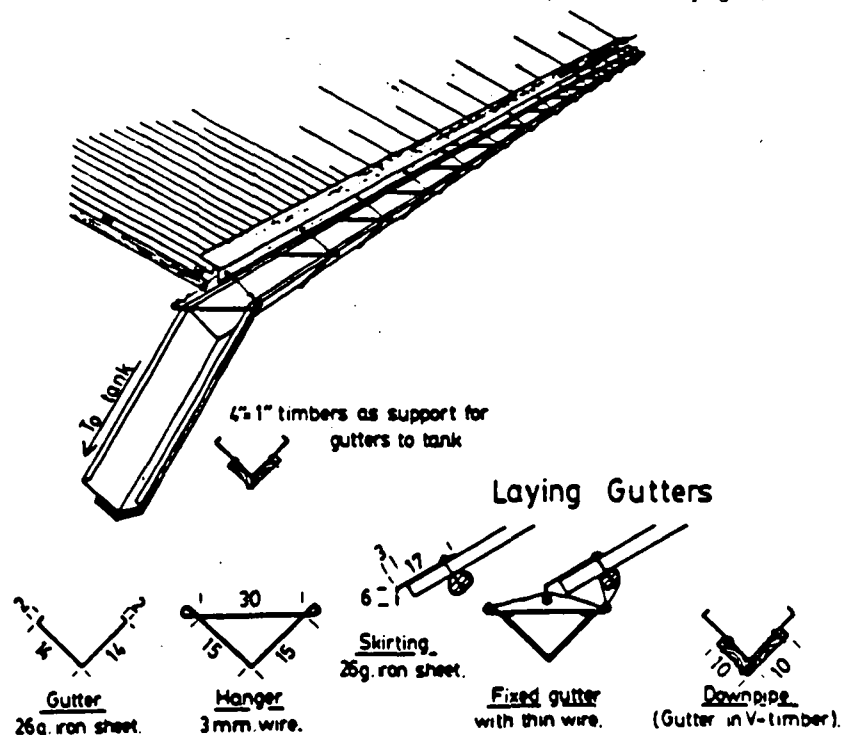
The latest national Kenyan development budget allocation to the Ministry of Water Development targeted 67 percent for water project capital costs and rural water supply. However, even this significant commitment can not begin to meet the need for improved water supplies.

Kenya is fortunate in having financial and technical assistance from many bilateral and multilateral donors, and secular and religious NGOs. Almost every donor organization supports the water supply sector in one form or another, and some have been involved for more than 15 years. These organizations include the Kenya Water for Health Organization (KWAHO), UNICEF,

American Medical and Research Foundation (AMREF), Oxfam, World Neighbors, African Housing Fund (AHF), Peace Corps, and diverse religious organizations.

Recent Kenyan water projects include village-level NGO projects supporting tank construction for individual houses, and several groups are providing materials or setting up revolving loan funds for tanks in dispensaries and schools. AMREF is providing four 10,000-liter tanks for a school with 400 pupils in the village of Kisil in western Kenya, and a 5,000-liter tank for a nearby dispensary.

*(continued on page 6)*



**DANIDA Gutter Design**

(continued from page 5)

While progress is being made, in the words of one water development agent, "*Limited roof collection for schools still amounts to only a drop on a sizzling platter in the target dry areas.*" But it does provide pupils with drinking and cooking water during school hours, lessening the need for mothers to fetch and send their children to school with water that they could otherwise use for cooking and other household needs.

The Norwegian-funded African Housing Fund (AHF) supports particularly imaginative projects with low-income Kenyan women in the cities of Kitui and Nairobi. Cooperatives of women now manufacture thousands of building blocks, roofing tiles, and special rounded bricks for rainwater tanks. They market their products to the local building trade and also use them to construct their own homes with self-help labor. (See Technology News for details.)

### Training Promotes RWH Options

Training of technicians and public health personnel, community leaders, masons, carpenters, and plumbers is an important feature of many Kenyan RWH and general water supply programs. For example, AMREF currently offers a one-month water training session to Kenyan public health officers, water technicians, environmental scientists, and 20 health workers from other African countries who are pursuing degrees in community health. The World Bank also conducts one-month training sessions in water issues. UNICEF supports community leadership training as a "key element in sustainable success" for water-supply projects.

Kenyan secondary school health clubs also provide vital assistance in spreading messages to their communities about water and sanitation—explaining not to drink or bathe in polluted streams, the importance of washing hands, and the health benefits of effective latrines.

### Local RWH Networks

Until recently there has been no formal or organized coordination of rainwater harvesting activities in Kenya, although there has been fairly regular communication among involved agencies. In 1987, World Neighbors and Oxfam collaborated by co-sponsoring a national ferrocement RWH tank workshop in 1987.

In one example of ongoing collaboration, UNICEF and DANIDA work in Kitui district projects through the Catholic dioceses, which in turn uses Peace Corps volunteers working through the Ministry of Water Development. Also, AMREF and CARE are both working in the same district of Kibwezi, one in wells and the other in roof catchment, and they collaborate to avoid overlap.

Even with continuing efforts to network and compare experiences, there have been several rainwater harvesting projects trying to promote techniques that have already proven to be unsuitable by other local projects.

### First Kenyan IRCSA Workshop

In May 1991, John Mbugua, the Kenyan national representative of the newly-formed International Rainwater Catchment Systems Association (IRCSA) organized and hosted a RWH workshop. This workshop served as an important sign of increased coordination and collaboration in Kenyan rainwater harvesting activities. Its purpose was to review applied RWH research findings and priorities, examine RWH management and maintenance systems, and learn from the many different Kenyan experiences in RWH.

### Kenyan Inter-African RWH Networking

The AMREF Environmental Health Unit launched a newsletter, *Water and Sanitation News*, in August 1990, to promote effective training in community-based water supply and sanitation projects among training schools and universities, within the U.N. WHO and other key organizations in Kenya and five other countries in eastern Africa.

On another level, *women's group leaders who travel (at AHF's expense) as far as 5,000 miles across the continent from Guinea and Senegal, share the experience, strength, and hope of Kenyan women.* The visiting women have been very quick to understand the importance of jobs manufacturing building blocks and roofing tiles. They can also see that with their own labor and income, they too can have new homes complete with gutters, rainwater tanks, and latrines. They know that if success continues, this will surely be a powerful model for others and for generations to come all across the continent.

*Constance C. Cohen lives in Nairobi, Kenya, where she is an editor for AMREF. She has spent 13 years in East Africa, living in Ethiopia, Tanzania, as well as in Kenya.*

---

## NETWORK PRIORITY

### RHIC Wants To Share Your Ideas With the Network

We urge you to share with the RHIC network the results of your own local adaptations of RWH technologies. But don't hesitate to let us know if an idea didn't pan out, because that could save another network member the time and expense of the same failure.

Hardly a month goes by without RHIC learning of some new adaptation or idea being applied in a RWH project from around the globe. We are sure there are literally dozens of good ideas and simple adaptations of RWH technologies that we haven't yet heard of. Once RHIC has such documentation, even if it is still in draft form or unpublished, it becomes a resource for the whole network. You may well see your contribution referred to in an issue of *Raindrop*.

Please take the time to send us a letter or copy of your report. The local USAID office can forward your letter. We look forward to hearing from you.

## HOW TO USE THE RHIC DATABASE

The RHIC data base is intended to serve all network members, and access to its publications and member data is available to any member. The RAINCOLL data base currently comprises 340 titles pertaining to a wide range of fields related to rainwater harvesting. Included are project reports, applied research studies, training manuals, and related documents.

Network member data can be retrieved by country, contact person, organization, type of RWH activity, and reports issued. If, for example, your project wants to explore the viability of promoting peri-urban rainwater harvesting, you can learn the location of other regional network members who are already building such systems and communicate directly with them or possibly arrange a site visit. Further, you can request designs for construction or request copies of the best reports or abstracts pertaining to peri-urban RWH in environments similar to your own.

To receive information on fellow network members' activities, or to locate documents on any topic relevant to rainwater harvesting, contact RHIC with your request. Please be as specific as possible about the information you are seeking. Contact:

Dan Campbell  
RHIC librarian  
Room 1001  
1611 North Kent  
Arlington, VA 22209 USA  
FAX 703-525-9137  
Telex No. WUI 64552

## News From Regional RHIC Reference Centers

RHIC now has two regional reference centers which serve to expand the RHIC network at regional and national levels. The Appropriate Technology Center in Togo and the Population and Community Development Association in Thailand are the first of what RHIC hopes will be an expanding number of regional reference centers.

Each center designates a staff member to respond to local requests for information on RWH, and to keep RHIC informed of relevant local projects, research, and information received from other local organizations who are active in RWH. In exchange, RHIC provides each center with a basic collection of rainwater documents and may provide technical

assistance in conducting local workshops and training courses, and in publishing and distributing manuals and reports.

The Togo Appropriate Technology Center held a pilot training workshop for RWH cistern building and related Guinea worm eradication. The April 24-30, 1991, workshop provided training to 20 Peace Corps volunteers and their national counterparts from Togo and neighboring Benin. A team of six local masons and metal workers were also trained in ferrocement cistern construction and guttering technology. Since 1986, the Togo Appropriate Technology Center has promoted low-cost ferrocement cisterns ranging in capacity from 1,000 to 20,000 liters.

---

---

## RAINDROP NOW AVAILABLE IN FRENCH EDITION

---

---

### RHIC --- WHAT- WHY - &- WHERE

The Rainwater Harvesting Information Center's (RHIC) objective is to increase potable water supplies for people living in rural and urban areas through the promotion of appropriate, low-cost self-help rainwater harvesting systems. RHIC is funded by USAID as a part of the Water and Sanitation for Health Project (WASH). RHIC's goals are to expand the membership of its network, increase technical information dissemination throughout the network, and to focus RHIC's technical assistance services in the areas of highest demand. As a means of meeting these goals, Raindrop is published twice a year in both English and French editions. The newsletter's objective is to provide you as members of the network, practical, field-oriented technical support and information about rainwater harvesting activities.

Raindrop encourages the exchange of information within the network so that our members can benefit from each other's experiences. It also reports on members' successes in a range of RWH activities including project implementation, field trials, extension, self-help community organization, etc.

One of Raindrop's primary objectives is to focus on under-documented areas and issues, relying on the network membership as well as our members' own technical expertise to improve the documentation on selected issues. You can help by letting us know how we can serve your needs. You can also contribute by sending to RHIC any relevant project reports, construction plans, photos, or even better, contribute an article to Raindrop. We look forward to hearing from you.

# INFORMATION RESOURCES



**Steps for Implementing Rural Water Supply and Sanitation Projects** (WASH Technical Report No. 62) This guide offers project planners and implementors a plan for achieving sustainable rural water and sanitation projects. The basis for the plan is the integration of the four components essential to the success of such projects: the water system, the sanitation system, hygiene education, and community development. The integration of these components develops the groundwork for a community to take on the management responsibilities of the improved sources.

**A Workshop Design For Community Participation: Starting Work with Communities, and Planning and Implementing Sustainable Projects.** (WASH Technical Report No. 33, Vols. 1&2) Field workers and project managers need good skills to promote community participation in water supply and sanitation projects. The purpose of these two companion workshops is to improve the skills of field workers responsible for promoting the active participation of communities in environmental health projects. The workshops provide detailed lesson plans and guides for skill building in organizing, encouraging, and facilitating the involvement of a community in solving its own environmental health problems.

The workshops can be readily adapted to RWH projects. The first two-week session covers entering communities, gathering information, organizing community groups, and helping communities to conduct surveys and identify and analyze their problems.

The second two-week session covers helping communities to plan, implement, and evaluate environmental health improvements and hygiene education programs so that they can be maintained and sustained by communities with limited external support.

**Community Management of Rural Water Supply and Sanitation Services** (WASH Technical Report No. 67) Examines the features of and requirements for community management, discusses the potential for developing project sustainability, and describes a five-level process that leads to a community's full participation in its own development. Analysis includes project experiences from Sierra Leone, Togo, Malawi, Guatemala, Kenya, the Philippines, and the United States.

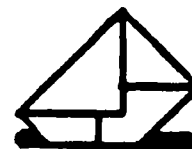
*Each of the WASH Reports above can be ordered (at no cost by development organizations) from: WASH, 1611 N. Kent, Room 1001, Arlington, Virginia 22209-2111 USA.*

**Grass Roots Development Video** "The Women's Construction Collective of Jamaica" is a 13-minute video about 10 unemployed young women from the poor neighborhoods of Kingston, Jamaica, who are trained in construction trade skills, operating their own construction business, and working on construction sites. This video has potential application for the start up of women's cistern construction businesses. When ordering, specify format of tape required. Send US\$22.95 check or money order payable to West Glen Films, c/o West Glen Communications, Inc., 1430 Broadway, New York, New York, 10018 USA.

## TRANET Mini-Library

As an in-depth local resource for community self-reliance, TRANET has developed a collection of 100 books and do-it-yourself manuals for use at the village level. Third World development workers selected these volumes, which are considered the best appropriate technology publications available. The cost of the library is US\$1,000, including delivery to any town or village. For information, write to: TRANET, P.O. Box 567, Rangeley, Maine 04970 USA.

## LETTERS FROM THE NETWORK



Dear RHIC,

During our summer drought in El Salvador from November through April, water is an especially precious commodity, not that it is not so during the rest of the year when it must be hauled up from the river for household use. Hence, every possible avenue to more and better water access must be explored and evaluated.

Years ago I noticed that the entire mountainside beside the airport at St. Thomas in the Virgin Islands was paved to capture and channel rainwater. At that time this source provided the island's only local supply of fresh water. Perhaps a catchment apparatus, if it could be constructed cheaply enough, might serve some of our needs here in this hilly terrain.

We would like to locate any available documents on rainwater harvesting in the Virgin Islands or elsewhere having to do with the paved mountainside catchment system. Your kind attention to our request is greatly appreciated.

Yours truly,  
Don Yarbrough  
La Loma Project  
Apartado Postal #1  
Sonsonate, El Salvador



# **NETWORK NEWS UPDATE**

## **GARNET News**

The newly formed Global Applied Research Network (GARNET) functions as an informal worldwide association of organizations and agencies sharing and disseminating information on applied research in water and sanitation. Participating organizations assume responsibility for a particular focus of information within the water and sanitation sector. WASH/RHIC is the GARNET topical coordinating agency for applied research in rainwater harvesting. Updates on relevant applied RWH research will be included in each issue of *Raindrop*.

**Centre Regional Pour L'Eau Potable et L'Assainissement a Faible Cout (CREPA), B.P. 7112, Ouagadougou 03, Burkina Faso.** Contact: T. Tandia. CREPA is conducting research on rainwater quality in rural areas outside of Ouagadougou in collaboration with the Comite Interfricain d'Etudes Hydraulique.

**Department of Environmental Engineering, Khon Kaen University, Faculty of Engineering, Khon Kaen 40002, Thailand.** Contact: Wanpen Wirojanagud. Conducted research on the bacteriological and chemical quality of stored rainwater. Rainwater samples were collected from indoor and outdoor storage containers of RWH systems. Findings show that health risks are due to bacteriological contamination rather than from heavy metals.

**Faculty of Social Sciences and Humanities, Mahidol University, Salaya, Thailand.** Contact: N. Tunyavanich. Recently completed a four-year research project on village acceptance of rainwater jars in north-east Thailand. The study investigated use of jar water, taste preferences, jar acquisition, ownership, and construction quality of jars.

**National University of Singapore, Department of Civil Engineering, Singapore.** Contact: P. Paramasivam. Constructed prototype ferrocement RWH tanks of 5,000 and 16,000 liters. The tanks were filled to a height of 1.6 m and monitored regularly for almost two years. No leakage occurred and no waterproofing compound was used.

**University of Dar es Salaam, Department of Civil Engineering, PO Box 35131, Dar es Salaam, Tanzania.** Contact: A.W. Mayo or D.A. Mashauri. Recently conducted research on rainwater quality in Dar es Salaam. Rainwater from tanks was sampled for fecal coliform, total coliform, and fecal streptococci.

## **IRCSA News**

- A rainwater harvesting workshop held May 28-29, 1991, at Nakuru, Kenya, was sponsored by the International Rainwater Catchment Systems Association (IRCSA). The workshop was organized by the Kenya National Representative John Mbugua.
- The upcoming 5th International Conference on Rainwater Cistern Systems has received more than 75 abstracts, an indication that the conference will be well attended.
- A regional IRCSA seminar on RWH is being planned for October 1992, in Kyoto, Japan. The organizer is Professor Isao Minami, Department of Agricultural Engineering, Kyoto University, Kitashirakawa, Sakyo Kyoto City, Japan.
- Rectification of the constitution and bylaws of the IRCSA will be made at the general assembly meeting later this year during the 5th ICORWCS in Keelung, Taiwan. The IRCSA membership drive will then proceed.

## **CONFERENCES**

### **ICORWCS Conference**

Over 60 technical papers have already been submitted for the 5th International Conference on Rainwater Cistern Systems (ICORWCS) to be held in Taiwan during August 4-9, 1991. The deadline for submission of papers was January 31, 1991. The conference theme will be "Rainwater Catchment For Future Generations." For further information, contact:

Professor Show-Chyuan Chu  
Dept. of River and Harbor  
Engineering  
National Taiwan Ocean  
University  
Keelung, Taiwan

### **Ferrocement Conference**

The 4th International Symposium on Ferrocement will be held in Havana, Cuba, during October 22-25, 1991. A short course will also take place from October 17-19. The conference theme is "Ferrocement: Its Role in Construction Development". The official languages of the symposium and short course are English and Spanish. Abstracts of conference papers are to be submitted before December 31, 1990.

Conference sponsors are the International Coordinating Committee on Ferrocement (ICCF) and the Cuban National Engineers (UNAICC). For more information, contact:

International Conference  
Center  
Calle 146, Entre 11 Y 13,  
Playa P.O. Box 16046  
La Habana, Cuba  
Telex to Fidel Delago at:  
511301 PPCH CU

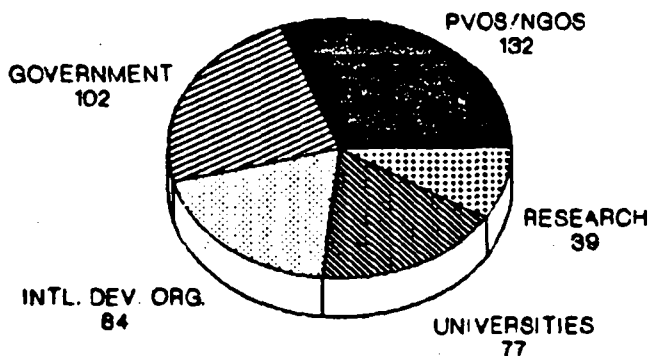
## Oxfam Sells Water to Fund Water Projects



Environment and health conscious consumers in Canada may have begun to brighten the future for development organizations that rely on private fund raising. Last year, Oxfam Canada began marketing Eau Secours brand mineral water through local bottlers Les Breuvages Nora. As a part of the advertising campaign, consumers learn that all proceeds from the sale of Eau Secours enable Oxfam to support water-supply development projects in the Third World.

Oxfam has reached agreements with gasoline stations in Quebec to sell the mineral water, and is negotiating for the same through its U.S., U.K., and Belgian counterpart organizations. Sales estimates are for 2.4 million liters this year, which will raise some \$208,000 for ongoing water projects in Mali and Burkina Faso. The water is sold in 1.5-liter bottles and costs between \$0.65 and \$1.07, depending on the retailer. For more information, contact: OXFAM-Quebec, 169 rue Saint-Paul Est, Montreal, QC H2Y 1G8, Canada.

### Types of Organizations in RHIC Network



Source: RAINCOLL Data Base

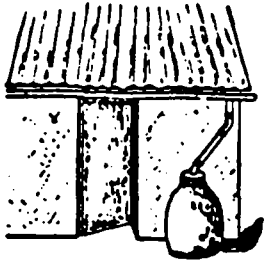


### Peace Corps Active in Kenyan RWH

Most of the 27 Peace Corps volunteers currently working in Kenyan water projects are actively promoting rainwater harvesting as a source of safe drinking water. Their projects range from large community-based projects at primary and secondary schools and health centers to small individual home installations. Most of the volunteers are active in areas of the Rift Valley Provinces where annual rainfall averages up to 2,000 mm, although some volunteers are also working in semi-arid areas developing both ground and roof catchments.

The volunteers take on a variety of tasks: advising on the location of the water tank and its optimal size; assisting in community organization; and helping to implement informal educational programs that promote understanding of the projects' health and practical benefits, and that help to assure committed participation on the part of the community.

Communities are always required to provide a part of the total cost of their project. A few communities and public institutions are able to meet the full cost themselves, but most seek 50 to 75 percent assistance from an outside donor or from Kenya's own Rural Development Fund. Communities usually contribute the locally available materials such as sand, rocks, gravel, lumber, water, and labor.



Dear Colleague:

The WASH Rainwater Network is updating its mailing list. **If you wish to continue receiving RAINDROP, please fill in the form below and return it to WASH no later than July 30, 1991.** If no response is received, your name will be dropped from the mailing list.

1) Name: \_\_\_\_\_ Title: \_\_\_\_\_

2) Organization: \_\_\_\_\_  
\_\_\_\_\_

3) Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4) RAINDROP has been helpful: YES \_\_\_\_\_ NO \_\_\_\_\_  
If useful, please describe briefly in what way.

5) Suggestions for future issues or improvements to RAINDROP.

**PLEASE RETURN TO:**

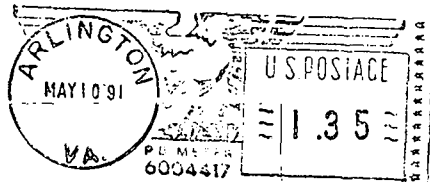
**RAINWATER HARVESTING INFORMATION CENTER  
WASH PROJECT  
1611 North Kent Street, Suite 1001  
Arlington, Virginia 22209 USA  
FAX: (703) 525-9137**

7

3-4

\* to mudd.  
\* SOSOP.

\* CP TP12 / comp paper.  
\*



**WATER AND SANITATION  
FOR HEALTH PROJECT**

**OPERATIONS CENTER**  
1611 N. Kent Street, Room 1001  
Arlington, Virginia 22209-2111 USA

→ For DOC.

MS. L. BURGERS  
INTERNATIONAL REFERENCE CENTRE FOR  
COMMUNITY WATER SUPPLY & SANITATION  
PO BOX 93190  
2509 AD, THE HAGUE  
NETHERLANDS

**AIRMAIL**

**PRINTED MATTER**