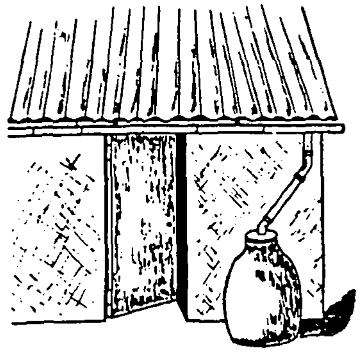


RAINDROP

Rainwater Harvesting Bulletin

April 1990 **Vol. 3**

Report On RWH Project in Togo

by Louis O'Brien

The RWSSP funded 250 cisterns.

The opportunity to visit a project after it is completed is unfortunately rare. The author, a previous staff member of the USAID-funded Togo Rural Water Supply and Sanitation Project (RWSSP), undertook a survey of 11 rural villages three years after rainwater harvesting (RWH) systems were constructed. Questionnaires were administered to the village committees, women, heads of families, and community development agents responsible for RWH.

In 12 percent of central and northern Togolese communities where RWSSP attempted to drill wells, groundwater tables were insufficient and well holes dry. If additional water sources were to be developed for these villages, rainwater harvesting was the only viable option. In some villages women had to carry water from groundwater sources so distant that in the dry season this arduous, daily task began before sunrise and ended long after dark.

The survey on which this article is based revealed two important results of RWH installations in the project villages—improvements in women's lives and family health. These topics are highlighted below, followed by a fuller description of project results.

WOMEN'S LIVES IMPROVE

The project had a major, positive impact on women. More freedom from the task of water-carrying raised their status and gave them time to do a variety of other productive tasks, such as caring for their children, going to the dispensary, and engaging in income-producing activities like gardening and marketing.

HEALTH IMPROVES

Health records from government dispensaries showed a two-thirds drop in diarrheal disease between January 1987 and January 1990 in the project villages. A similar drop in the prevalence of guinea worm disease was also reported, although this was not readily documented, because the disease is treated in the home and not reported to dispensaries.

PROJECT BACKGROUND

The object of RWSSP, initiated in 1980, was to supply potable water, health education, and related community organization to 860 villages in the central (Plateaux) and northern (Savannah) regions of Togo. Project construction of rainwater harvesting systems ended almost three years ago, in August 1987, and the 11 recipient villages have since received no further RWH assistance.

By the project's end, construction totaled 250 cisterns and 55 open-walled hangars, which serve as rainwater collection surfaces. A standardized rainwater harvesting system was adopted to use project resources efficiently and

continued on page 5

FROM THE EDITOR'S DESK

Re-evaluating the Costs of RWH

Cost analyses for development aid investments in RWH systems typically compare RWH costs with those from other locations where pump-equipped wells provide adequate, year-round water resources. This direct comparison may misrepresent and exclude critical cost and benefit considerations for RWH.

Where no other potable water source is available or viable, augmenting critically limited water supplies can have unique and immense benefits. In areas where the ground water table is falling, the cost of depleting this invaluable resource must not be ignored.

Planners and policy makers urgently need to take a broader, longer range look at determining water supply options, by considering the costs and benefits in villages where only distant water sources are viable or where RWH is the only viable option to augment existing water supplies.

For example, this issue's feature article on RWH in Togo describes villages where well drilling is fruitless. With no other water source available, village women walk 10-15km per day to supply all water needs for their families. Togalese villages benefiting from USAID-funded cistern construction are not viable locations for well drilling. Making a simple comparison of RWH costs with those for drilled wells is not logical or appropriate. So although RWH construction costs are higher per person served, the project chose RWH in dry villages.

On a broader and long-range scale, economic and political valuations for water supply options must take into account that ever-increasing water well pumping is depleting regional water tables. This is already common in large land areas. For example, across sub-Saharan Africa, water tables are dropping several meters per decade, forcing villagers to dig old wells deeper and abandon dry wells. Along the Southwest coastal region of the USA, water tables have dropped 1-2 meters per year. In Beijing, China, where there are similar rates of water table depletion, a third of the city's wells have gone dry. It is increasingly apparent that reliance on underground water supplies without considering long-term cost is unwise.

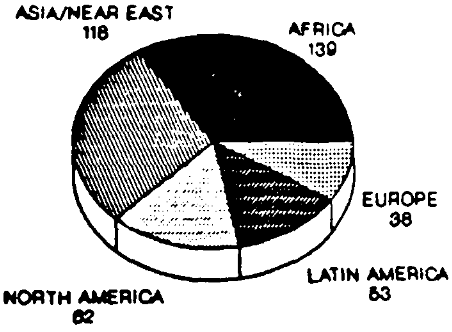
Drilling new and deeper water wells to meet expanding needs is not an option in many regions. The world's underground water supplies are limited, not infinite. The expanded and cumulative use of this finite resource is costly in both economic and environmental terms.

For centuries, RWH has been a viable source of water. Now, and even more in years to come, RWH has vast potential to ease water shortages in rural, peri-urban, and urban areas.

C.J. Lindblad
Editor

C.J. Lindblad has worked in rural development extension and training for the past 17 years

NETWORK MEMBERSHIP UPDATE



MEMBERSHIP DISTRIBUTION

Source: RAINCOLL Database

There are currently 411 RHIC Network members, including individuals, institutions, and organizations from 87 countries worldwide. This represents a 30% membership increase, with 125 new members and 10 additional countries over the past six months.

Members are involved in a range of RWH activities, from grass-roots project implementation to university-based research. Membership is open to any individual or organization involved in rainwater harvesting, and there are no dues or fees.

WASH

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

How Large Should a Family Cistern Be?

by C. J. Lindblad

At first glance, it might seem that a cistern needs to be large enough to store all the rainfall collected during the year. However, the family will use water from the cistern throughout the year, reducing the required cistern volume. Standardized calculations used to determine the optimal capacity of a cistern correlate the average monthly rainfall, roof size, and family water consumption needs.

Ideally, a family rainwater harvesting (RWH) system provides all of the water needed for drinking, cooking, washing, etc. Typically though, several factors limit the potential volume of water from RWH. The unalterable limitations are the annual rainfall and the dry season duration. Less fixed variables are the area of the roof(s) or other rainwater collection surfaces and maximum cistern capacity, but their cost is also a critical limiting factor.

Health specialists have determined that 5 liters of potable water per day are needed to satisfy the minimum daily requirements for each person. Note that 5 liters is the water needed for drinking only. Total water needs for an individual are 50 liters per day or more. In practice, most families using RWH would prefer to have the collection area and cistern be as large as possible. However, even with project assistance, few families can afford to build the optimal size cistern(s) at the outset.

Larger cisterns typically cost more per volume due to the more sturdy construction required as water pressure increases with water volume. This is a critical variable. Field trials are being conducted in many locations around the world to develop and evaluate various low cost cistern designs.

A basic starting point for calculating cistern size is to evaluate the amount of rain which can be harvested from the available roof or collection area. This is done be multiplying the catchment area by the annual rainfall. Clearly, the larger the surface area covered by roof, the greater the amount of rainwater that can be harvested. Catchment surface is arrived at by measuring the dimensions of the ground surface covered by the roof. The roof surface is not measured, so whether the roof is a flat sloping surface or has two or four slopes is not important to the calculation. The figure below depicts the difference in general vs. roof surface area.

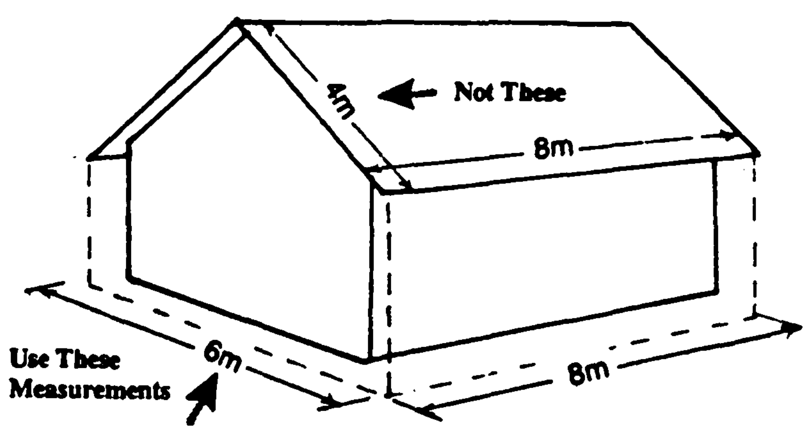
Annual and monthly rainfall rates are usually available from the local meteorological station, airport, or university. Rainfall patterns vary from year to year, so experts advise that RWH calculations be based on the lowest rainfall in eight or nine of the past ten years.

DAILY AND MONTHLY WATER NEEDS

To determine the minimum daily potable water needs for a family, the number of persons is multiplied by the amount of water to be supplied per day. At the optimal minimum of 5 liters per day, a family of 10 would need 50 liters per day. Monthly water needed is that amount multiplied by 30 days, or 50 liters x 30 days = 1500 liters per month.

CATCHMENT AREA RWH POTENTIAL

To determine the monthly rainwater harvesting potential of a collection surface, multiply the ground area covered by the roof (width x length) by the probable monthly rainfall figures referred to above. If there are dry season months when less than 1500 liters will be collected, the cumulative total water deficit is one way of defining optimal minimum cistern size. For example, if during May through August there is no rainfall, the cistern needs to store at least four months water supply, or 6,000 liters, to supply the family 1500 liters per month.



Roof Catchment Area

HELP RHIC EXPAND THE NETWORK

You can help expand the Network by submitting the names and addresses of other individuals or organizations who may wish to be nominated as Network members to RHIC. Thanks for helping!

Since the first issue of **RAINDROP** in late 1988, the RHIC Network has grown rapidly from 231 members in 25 countries to its present 411 members in over 87 countries!! This demonstrates a strong interest in rainwater harvesting and indicates that people in developing countries all over the globe want information on the subject.

One important aspect of Network growth is that with each new member, the RHIC information base expands. By filling out a standard Network questionnaire, new members supply RHIC with basic information on their RWH activities and system designs, reports, information needs, and innovations. The broader the RHIC Network becomes, the more information and experience there will be to offer Network members.

RAINCOLL Is Yours To Use
Network members' names, addresses, and RWH activities are recorded in the RAINCOLL data base and can be accessed by name, organization, country, RWH activity, or report issued. Access to its publications and database is available to any member.

Would you like to know where Network members are constructing ferro-cement cisterns or compare field experiences with or visit other RWH projects in countries nearby? For information, contact Dan Campbell, RHIC librarian, and be as specific as possible about the information you are seeking.

WASH/RHIC
Room 1001
1611 North Kent
Arlington, VA 22209 USA

NETWORK MEMBER PERSPECTIVE

Guest Editorial

Importance of Project Supervision

by Ron Goodden

Providing rural or urban dwellers with the materials and know-how to produce their own rainwater-catchment tanks is a proven way to increase the urgently lacking supplies of safe drinking water. Supporting such projects can add meaningfully to public health and quality of life, by providing an alternative to distant or polluted water sources.

However, the actual impact of a project is often dependent upon the supervision major donor agencies are prepared to exercise in the implementation stage. It is a fact of life in most developing countries that the actions of public officials—including those involved in development—are not usually subject to the public scrutiny and accountability more common in the developed world.

Program managers must be careful to recognize the danger of malpractice and corruption, anticipate problems, and take common sense steps to help protect program resources.

For instance, rather than relying solely on formal inspections of project sites and progress reports from local officials, managers can create opportunities in project monitoring for private, one-on-one conversations with villagers, to make sure that villagers' perspectives are in accord with the official reports.

Given the chance, village housewives can be remarkably unabashed sources of information about what is really going on in a village. Are villagers actually receiving project materials in both the quantity and quality specified? Inferior or inadequate supplies will translate into reduced project output. Are villagers being pressured into paying for things that are supposed to be free? Allowing local officials to successfully collect "donations" from project beneficiaries for use in unspecified "future development projects" is simply imprudent.

In addition, program managers should be well informed about the field activities of other donors who are funding projects in their area. In cases where more than one donor is funding water tank construction, each should be aware of the others' projects including what resources are being supplied, for what purpose, and in which villages. Subsequent project delays and changes should be communicated to all, with each donor organization making a point of knowing exactly which finished products were produced by which donor.

Marking finished water tanks is an effective method of letting villagers know the source of development funding. Spray paint and stencils cut to reproduce the donor agency's logo or name accomplish this nicely, and may be done to add to the aesthetics of the finished tank. If done promptly enough, individually marking completed tanks also makes it more difficult for officials to indulge in irregular practices or misrepresentation.

Strategies designed to protect program resources may, of course, arouse bureaucratic resistance, but the experienced manager may be able to integrate better measures of accountability. These will ultimately benefit villagers and donors alike.

Ron Goodden is a US-based consultant who has spent ten years in Asia, most recently administering rural development projects for the United Nations.

Togo Report... *from page 1*

quickly, since RWSSP had only 21 months funding remaining when the RWH component was designed and 16 months when construction began. Given this rigorous time constraint and the goal of serving 24 priority villages (although 11 were eventually served), post-project replicability of the system was not the highest priority. Village selection criteria included population, distance to water sources, community organization, and prevalence of guinea worm disease.

Several RWH systems were tested before an adaptation of a cement brick grain bin, developed in neighboring Benin, was found to be structurally viable, least expensive, and conducive to being produced on a large scale. This 6000 liter cistern cost CFA90,000 (US$300) per unit. Considering annual local rainfall and assuming effective water rationing, the cistern provides up to 35-55 liters daily. This is enough drinking water for the standard optimum five liters per day per person for 7 to 12 persons, the average size of a Togolese family. Variations depend on regional rainfall patterns.

FEW VIABLE ROOFS FOR RWH

Early RWSSP village surveys showed few communities had adequate roofs for this scale of RWH. Roofs were either thatch, too low to the ground for the standard cistern height of 2.5 meters, or not sturdy enough to attach effective gutters. To resolve this problem, a sturdy but simple open-air aluminum-roofed shed was designed. Known locally as a hangar, its dimensions are 5m x 10m, and it cost CFA270,000 ($900).

The complete rain water harvesting system consisted of a hangar and four cisterns capable of providing enough drinking water for 28 to 44 people. Although the hangars were criticized for adding to the cost and complexity of project activities, their construction was justified to permit a standardized cistern size and to speed the construction process. Due to time and resource constraints, construction went on simultaneously in all 11 villages. The necessary coordination was exhaustive and apparently effective.

To protect water quality, a foul-flush system for each cistern was added to the standard design. Participating villagers also received training in the importance and methods of annual cistern disinfection.

Exclusive of the village contribution of labor and local materials and project-provided skilled labor, the total cost for the four cistern and hangar system came to CFA630,000 or $2,200, or about CFA15,750 ($53) per person. This compares with costs from other villages where deep-well hand-pump systems cost CFA14,000 ($47) per person served, at the rate of 250 people per well. A well with an operational hand-pump can provide significantly more water per person, but wells were simply not an option in these villages.

SYSTEMS STILL IN USE

Only one cistern was not being used, resulting in a 99% rate of RWH systems still operating after three years. Remarkably, 84% of the cisterns were still in excellent condition. None had problems that could not be repaired by the villagers. In contrast, about 40% of the RWSSP hand-pumps were broken and the wells unused.

Only half of the cisterns had functioning foul-flush systems. Those in use were almost all in good repair, however in the Plateau region, villagers chose not to use the foul-flush system and blocked the mechanism open.

WATER RATIONING PROBLEMS

RWSSP village agents went to great lengths to inform villagers about the importance of using the cistern only for drinking water and how to ration water effectively. Several unforeseen factors affected water rationing practices. In most communities, villagers do not use their cisterns year-round as the project had assumed.

Some villages adapted RWH hangars for schools, markets, and cotton storage.

Reasons for disregarding these instructions seem to be varied. In some villages new settlers were accommodated from the limited cistern water. This is in keeping with the tradition of sharing with those in need, but it further taxed the cisterns' capacity and led many people in the villages to conclude that RWH was not a good water supply. In at least two villages, men reportedly used cistern water for bathing.

The survey showed that during the rainy season, families tend to rely on traditional water sources that are close

continued on page 6

NETWORK PRIORITY

Foul-Flush Mechanisms

The first water to run off the roof after rain begins to fall is called the foul flush. This rainwater washes with it the dust, leaves, bird droppings, etc. that have accumulated on the roof since the last rain. A foul-flush system channels off the first 50 liters or so of dirty water, so it does not enter the cistern. This reduces the possibility of contamination and fouling the drinking water quality. The addition of a foul-flush mechanism to a rainwater harvesting system may significantly improve the potability of rainwater harvested from roof surfaces.

RHIC is launching an information search focusing on flush mechanisms being developed and used around the world. One innovative foul-flush mechanism designed and used in Togo was featured in the first issue of RAINDROP. RHIC wants to learn of other foul-flush systems that have been user-tested, especially those that are low cost and mechanically simple.

Because the RHIC Network reaches more than 87 countries, news of proven technologies can spread far and wide. As an example of the demand for RWH information from the RHIC database, after the recent hurricane in the Virgin Islands, RHIC received an urgent request from the local office of the U.S. Environmental Project Agency for information on the design of foul-flush mechanisms. Unfortunately, there is little published information on user-tested foul-flush mechanisms, and RHIC could only make a limited response to this request. The RHIC network can surely add to the available information on this subject.

Whether you are developing an innovative foul-flush system, or using a long-tested system, please send RHIC information on its design, construction materials, and how many examples are already in use. If a photograph or drawing is available, send it too.

Togo Report...*from page 5*

by and in relative abundance. Cistern water is conserved until nearby water sources become scarce. When cistern water is used until that supply is exhausted. Thereafter, women return to carrying all of their family's water. The sources are then at their lowest ebb, making the collection process extremely time consuming.

Once empty, the cisterns remain empty and unused for two or more months of the dry season. Not surprisingly, all villages responded that the cisterns are too small and they want more and larger models.

The major result of these practices is that the family loses the year-round health benefits of using the cistern water for drinking. Also, women haul more water from distant or meager sources late in the dry season when the cisterns are empty.

SOME EXPAND RWH CAPACITY

Since the end of RWSSP, families in six villages increased their RWH by using barrels and clay jars. In one village some families had contracted with a local mason to construct a low cost, 1000 liter cistern. This partially underground cistern is made with molded mud walls reinforced only with a layer of cement on the interior. It was not clear if this model had been used and tested elsewhere. They had not yet been filled to capacity, so their durability remains to be seen.

HANGARS HAVE BENEFITS

There was almost no project involvement in determining how the hangars would be used, except to designate the village committee as responsible for that decision. The survey found that just over half of hangars are not used. In some cases, villagers were not certain that the decision regarding hangar use was theirs to make. Other villages reported that they did not yet have the resources to put the hangars to use as they would like.

Those villages that did adapt the hangars to other uses benefited significantly. One village uses the hangars for a new weekly market that also serves several neighboring villages. Some expanded village schools, and several use the hangars to store the cotton harvest. Others use their hangars for religious gatherings and meeting halls. In almost half the villages, the hangar constructions significantly benefit villages, contributing to the local economy, increasing local services, and adding to villagers' overall sense of community and pride.

WOMEN LIKE RWH

Women's appreciation of the new cisterns and of RWH is not surprising, since they often spent six to nine hours per day collecting water. Nearly all women reported direct improvements in their lives and the health of their families.

The villagers, especially the women, clearly agreed that before the RWH cisterns were built, women were viewed as water carriers, and their contribution to family and village prosperity was not considered consequential. Women had little time to care for children, contribute to field work, cook, or do any of those tasks from which village women derive self-satisfaction and the respect of others.

Several men mentioned that prior to the RWH cisterns, it was difficult or impossible to find a woman willing to marry someone from their village, because the prospect of spending six to nine hours a day fetching water is not appealing. "Now, however, women are no longer afraid of marrying men from our village."

Louis O'Brien recently returned from Togo where he lived for five years, serving on two USAID-financed health sector projects. He now works for the Development Assistance Corporation based in Washington, D.C

Local Networking in Kara, Togo

by Louis O'Brien

Exchanging information and ideas is a key ingredient in effective development programs especially, where similar activities are happening in several areas. Typically though, long distances and difficult communications constrain the flow of information. Often good ideas get lost and......

A small but vital organization in northern Togo is bridging the information gap for rural development activities in the country, and RWH technologies are a primary focus of their activities. The Appropriate Technology Center provides linkage between various Togolese technicians involved in program design, technology design, and village-based development work. The Center demonstrates effective technologies and provides relevant training, promotes the exchange of ideas and knowledge among projects, and shares relevant research from other countries.

Founded in 1986 by the Government of Togo, with collaboration between UNICEF and the U.S. Peace Corps, this Center has established itself nationally and inter-regionally as a clearing house for innovative technologies and as a facilitator and base for the organization of training sessions and extension campaigns. The Center is staffed by a Togolese director and a Peace Corps volunteer who serves as information coordinator. A small group of support personnel assists in construction of demonstration models and serves as training support staff.

The Center has responded to requests for RWH technical assistance and information from such organizations as UNICEF, World Neighbors, and Peace Corps. It is also in communication with development organizations from several countries to exchange documents and publications for and from its library.

In addition to its RWH interest, the Center also promotes improved clay cooking stoves, hand-dug wells, reforestation, and solar energy. For each of these technologies, the Center's support activities include the collection and dissemination of field-derived and research information, demonstration models and trials, and training for such groups as rural development agents, Peace Corps volunteers, and school teachers.

Training junior and high school teachers has been emphasized, with the intent of integrating the philosophy of appropriate technology into the secondary school curricula. Center personnel also work with farmers, artisans, and women's groups. Trainees learn theory as well as practice. Everyone who studies RWH learns both how to calculate water consumption needs and how to build a cistern and hang gutters.

Currently the Center demonstrates and promotes three cistern models. One is based on the design of a traditional spherical grain bin made with molded clay walls. Once the traditional bin is built on a concrete base, the interior is ferro-cemented, resulting in a 3,500 liter cistern at a materials cost of about CFA37,500 (US$125). The oldest model has been in use for four years and has needed no repair.

The gutter system developed for this model collects water from a straw roof, which is widely used in Togo, especially in the northern regions. This could be an important innovation in an area where a major problem for RWH is finding an appropriate rain catchment area.

Another cistern model has a capacity of 6000 liters and is made from clay bricks with a ferro-cemented interior. It is still undergoing testing, but the initial results seem positive. It is also low cost (US$125) and easy to construct. The Center's 12,800 liter model is built underground. It is a cement lined spherical pit with a dome-shaped concrete cover. The local soil structure is stable and the pit is also layered initially with a compacted clay. This experimental construction technique using no metal re-enforcement has been in use for three years without need for repair. Total materials cost was CFA172,000 (US$240).

FUTURE ACTIVITIES

Though the Center's financing remains an ever present constraint, its future seems bright. In 1989, more than 4,000 visitors were registered at the Center. With a strong commitment from the Government of Togo and the support of several international agencies, the Center will continue to prosper.

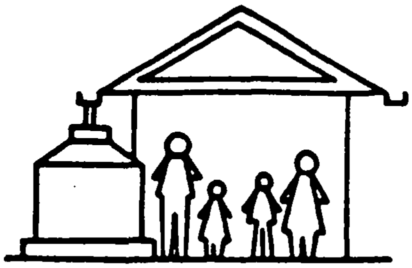
Within the national framework, the Center hopes to continue involving governmental and private agencies. This will be accomplished by promoting its various activities—further dissemination of information and strengthening links among the Center, school teachers, and rural development agents. The Center also has more than 100 slides depicting the construction stages of a number of other appropriate technologies. In addition the Center is completing a slide show to be reproduced and made available, along with modest projection equipment, in each of Togo's five regions.

On an international level, the Center is interested in increasing ties with other agencies and projects, and in further developing a library of technical and organizational information. In rainwater harvesting, the Center would like to obtain more information about low cost family-size cisterns, use of local materials for concrete reinforcement, and straw roof rain catchment techniques.

Any ideas from RAINDROP readers would be most welcome. Also, if readers are interested in obtaining further information about the Center and its activities, they can write to the following address:

Centre de la Technologie Appropriée
B.P. 278
Kara, TOGO

NETWORK NEWS



IRCSA Update:

The International Rainwater Catchment Systems Association (IRCSA) was formed during the recent 4th International Conference on Rainwater Catchment Systems held in Manila. A draft of the constitution and bylaws has been forwarded to members of the International Organizing Committee for review. Once the constitution is formally accepted, the IRCSA Executive Board will start the formal membership drive and identify an initial site for the headquarters.

New members of the IRCSA Executive Board include:

John E. Gould
Secretary General
85 Thanington Road
Canterbury, Kent, CTI 3AU
United Kingdom

Dr. Adhityan Appan
Regional Director of South Asia
School of Civil & Structural Engineering
Nanyang Technological Institute
Nanyang Road 2263
Singapore

Craig Hafner
Regional Director of North America
WASH Deputy Project Director
1611 N. Kent Street Rm.1002
Arlington, Virginia, 22209 USA

Erik Nissen-Petersen
Regional Director of Africa
ASAL Consultants
P.O. Box 14333
Nairobi, Kenya

IRC Update:

IRC International Water and Sanitation Center in the Netherlands, has just completed a review of water harvesting experiences in Botswana, Kenya, Mali, Tanzania, and Togo.

This review focuses on traditional and newly introduced RWH systems in each country, including development, promotion, and construction activities. It examines socio-economic conditions, intervention strategies, and prospects for wider RWH usage in the 1990s.

Availability of the completed review will be annouced in **RAINDROP** and in the IRC Newsletter.
For further information, contact:
IRC
P.O. Box 93190
2509AD The Hague
The Netherlands
Phone: 31-70-3814911
Fax: 31-70-3814034

UPCOMING EVENTS

The 5th International Conference on Rain Water Cisten Systems (ICORWCS) will be held in Taiwan August 4-9, 1991. Its theme will be "Rain Water Catchment For Future Generations." Papers must be submitted by January 31, 1991. Contact:
Professor Show-Chyuan Chu
Dept. of River and Harbor Engineering
National Taiwan Ocean University,
Keelung, Taiwan 20224
Republic of China
FAX: 866-32-620724.

The 4th International Symposium on Ferrocement will be held in Havana, Cuba in October 1991. It will be sponsored by the International Coordinating Committee on Ferrocement (ICCF) and the Cuban National Engineers (UNAICC). Contact:
UNAICC
Humboldt No. 104
Esquina a Infanta
Vedado, Havana CUBA

RESOURCES

RAINWATER QUALITY
RHIC has compiled a bibliography of 12 reports that pertain to rainwater quality. Contact RHIC to request a copy.

FERROCEMENT
A Ferrocement Tank Construction Manual is available in Spanish, published by the University of Valle, Colombia. Cistern models are low cost, and the manual includes construction methods.
For information, write:
Mr. Peter Gondrie
Convenio Colombo Holandes
Apartado Aereo 056896
Bogota, D.E. Columbia

Appropriate Technology Information (ATI) promotes RWH and spring protection. Ferrocement water tanks prove to be the cheapest and sturdiest storage technology. Training materials including videos on ferrocement construction, a newsletter, and various publications, available at cost.
For information, write:
ATI, P.O. Box 11070, Dorspruit 3206
Pietermaritzburg, Natal, Republic of South Africa.

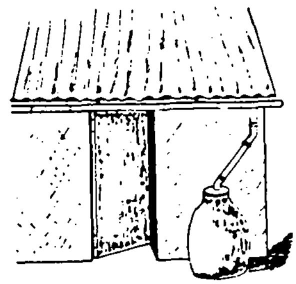
LETTERS

Dear RHIC,

I am very happy to note the birth of the Rainwater Harvesting Network. This is a very positive step to promote knowledge of rainwater harvesting, a subject which must be a rural development priority in many countries of the world. My association with rainwater harvesting goes back to 1985 as a part of a team that studied rainwater harvesting feasibility in Western Sudan. Since then, I have been involved in the development of a rainwater harvesting strategy for that drought-stricken area. I look forward to receiving future issues of **RAINDROP**.

Yours sincerely,
Anura Widanapathirana
Consultant, Sri Lanka

RAINDROP SURVEY



Please take a little time to answer the following questions and mail your response to RHIC at the address below. The RAINCOLL database seeks information on key issues in RWH from around the world. Your response will be useful to other Network members who are working in similar circumstances and who face similar problems. Please use additional space if necessary, and add any additional comments.

FOUL-FLUSH SYSTEMS

Foul-flush (or first-flush) systems divert from the cistern the first several liters of water that fall on the roof. This first rainwater may not be suitable for drinking, due to accumulated dirt, leaves, etc., on the roof.

1. What foul-flush systems, if any, are used in your area? Please include a brief description or drawing of the mechanism, information on its operation, cost, etc.

2. How many local RWH cisterns are equipped with foul-flush systems?

WATER RATIONING WITH RWH

RWH often provides only a supplement to the family's water needs. When this is the case, water must also be transported from traditional water sources—wells, streams, lakes, or springs—throughout much or all of the year. Especially in areas where there is a long dry season, rationing is very important if safe drinking water is to be available throughout the year.

1. In your area or region, how is stored rainwater used? (Drinking, cooking, washing ?)

2. Who controls RWH use and rationing?

3. Do local RWH cisterns run out of water each year before the rains begin? How many weeks or months are the cisterns usually empty?

Send your responses to:

Dan Campbell
WASH/RHIC
Room 1001
1611 North Kent
Arlington, VA 22209 USA