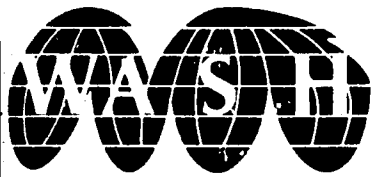


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# **COMMUNITY WATER SUPPLY AND SANITATION IN BURUNDI**

## **Report of an Evaluation Team**

### **WASH FIELD REPORT NO. 24**

**OCTOBER 1981**

**Prepared For:  
AID Affairs Officer in Burundi  
Order of Technical Direction No. 36**

WASHAID is managed  
by Dr. J. C. McKee  
Principal Investigator. Principal  
Cooperating Institutions and  
Contractors are: Interna-  
tional Science and Technology  
Center, Research Triangle  
Institution, Durham, North  
Carolina; and the Tech-  
nical University of Kenya.

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October 2, 1981

Ms. Abbe Fessenden  
Acting AID Affairs Officer  
American Embassy  
Bujumbura

Dear Ms. Fessenden:

On behalf of the WASH Project I am pleased to provide you with fifteen copies of a report on Community Water Supply and Sanitation in Burundi. This is the final report by Raymond Isely, David Goff, and Herbert Blank, and is based on their trip to Burundi from July 1 to July 24, 1981.

This assistance is the result of a request by the AID Affairs Officer on March 21, 1981. The work was undertaken by the WASH Project on April 6, 1981 by means of Order of Technical Direction No. 36, authorized by the USAID Office of Health in Washington.

If you have any questions or comments regarding the findings or recommendations contained in this report we will be happy to discuss them.

Sincerely yours,

Dennis B. Warner, Ph.D., P.E.  
Director  
WASH Project

DBW/RS  
Enclosure

cc: Victor W.R. Wehman, Jr.  
S&T/HEA

1611 N. Kent Street, Room 1002  
Arlington, Virginia 22209 USA

Telephone: (703) 243-8200  
Telex No. WUI 64552  
Cable Address WASHAID

The WASH Project is managed  
by Camp Dresser & McKee  
Corporation. Principal  
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Center, Research Triangle  
Institute, University of South  
Florida, and the University of Illinois.  
The project is funded by the  
U.S. Agency for International  
Development.

WASH FIELD TRIP REPORT NO. 24

BURUNDI

COMMUNITY WATER SUPPLY AND SANITATION  
IN BURUNDI

Report of an Evaluation Team

Prepared for the AID Affairs Officer in Burundi  
Order of Technical Direction No. 36

Prepared by:

Raymond B. Isely, M.D, M.P.H, D.T.M  
David Goff, P.E.  
and  
Herbert E. Blank, Ph.D.

October 1981

Contract No. AID/DSPE-C-0080  
Project No. 931-1176

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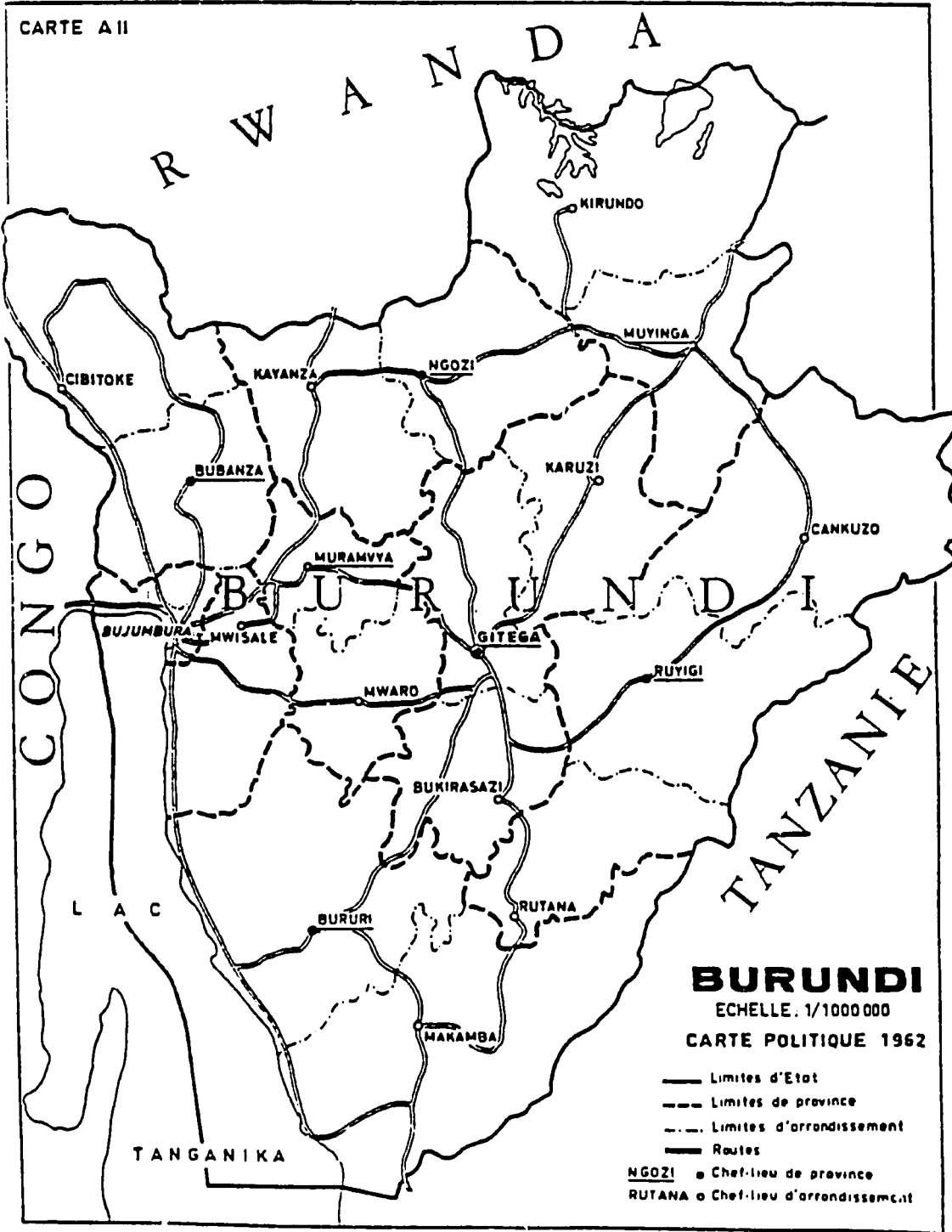
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## ACKNOWLEDGEMENTS

An evaluation of this type is not possible without the close cooperation of those for whom the evaluation is being done. Thanks are due, therefore, to many--first of all to AID staff Vicky Kunkle, Abbe Fessenden and Terry Lambacher who did everything possible to smooth the way for an efficient use of time. Thanks must be given to Claude and Ann Massar, to Salvator Yabokemi, and to Sylvane Ntirubaruto who made it possible for us to see what few outsiders can see in so short a time and who lightened and livened the burden of travel. Lastly, we acknowledge the help of the UNICEF Representative, Brigitte Trimmer-Smith, the Ministry of Rural Development and a host of others who are partly responsible for bringing this mission to a fruitful end.





## Chapter 1

### INTRODUCTION

From July 7 to July 24, 1981 a United States Agency for International Development (USAID) evaluation team visited Burundi in order to examine the UNICEF rural water and sanitation project in the context of the priorities and resources of the country, other donors, and USAID. The members of this team were Dr. Raymond B. Isely, Associate Director of the Water and Sanitation for Health (WASH) Project, Mr. David Goff, consulting engineer, and Dr. Herbert E. Blank, USAID engineer, REDSO/Nairobi.

#### 1.1 Purpose of Evaluation

The UNICEF project under the direction of Mr. Claude Massar forms the focus of this evaluation. From its inception in late 1978 the project has succeeded in capping over 650 springs using local labor and, in part, local materials. Eighty fontainiers (skilled local spring technicians) have been trained. The goal is the capping of 4,300 springs, including those never capped and those capped 5 to 30 years ago and in poor repair. Additional fontainiers, one for each "colline" or basic administrative unit, are foreseen. In addition the construction or the repair of some 250 kilometers of gravity-fed systems serving rural dispensaries, health centers and associated social units are planned.

Evaluation questions revolve around the viability of this project as a vehicle for coverage of the rural population (which is 95 percent of the population of Burundi) with essential water supply, sanitation, and improved health status, and as a possible opening wedge for other forms of rural development, such as improved housing, buying and selling cooperatives, reforestation, road and footpath improvement, etc. In order to answer these questions there must be answers to other questions related to the degree and quality of popular participation in the project, the availability of personnel, supplies, and equipment to support local participation, and the degree to which the government takes the responsibility for the long-term support and maintenance of project achievements.

Answers to these questions will be used to help determine whether USAID should help to finance this project in the short term and to include aspects of the project in long-term health and rural development planning.

#### 1.2 Rationale for WASH Role

WASH consultants were part of the evaluation team as a result of a request received from the AID Affairs Officer on 21

March, 1981. In response to their request, Order of Technical Direction No. 36 was issued (Appendix A).

WASH resources are being used to supplement the small program staff in Burundi and REDSO resources that are spread thinly over the countries of Eastern and Southern Africa. By using WASH resources AID Affairs Officer Burundi can accelerate considerably the process of decision-making on the possible financing of this project.

### 1.3 Overall Evaluation Plan

#### 1.3.1 Framework for Evaluation Questions

Figure 1 illustrates a simple systemic structure for framing evaluation questions. The UNICEF project is viewed as having three phases: initiation, operation, and effects (input, throughput, and output). At each phase specific questions can be derived from the items listed. Together the answers to these questions address the purpose of the evaluation. For instance, under "initiation" is found the item "request for water." This item suggests such questions as:

"How are requests for water formulated, transmitted and acted upon?"

"How do requests for water compare in frequency with requests for such things as roads, schools, dispensaries, tree planting, etc.?"

#### 1.3.2 Implementation of Plan

Analysis of the evaluation questions reveals the likely source of the information to answer them. These sources can be divided roughly into nine categories:

1. The Project Director: questions about project management, supplies, personnel, training.
2. Project Moniteurs (instructors): questions about local participation, the roles of the fontainiers, maintenance, and some about social/behavioral outcomes.
3. Fontainiers: questions about their roles, local participation, local materials, roles of local officials, and maintenance.
4. Local officials: questions about local participation, local materials, requests for water, water use, and sanitation related beliefs and behavior.

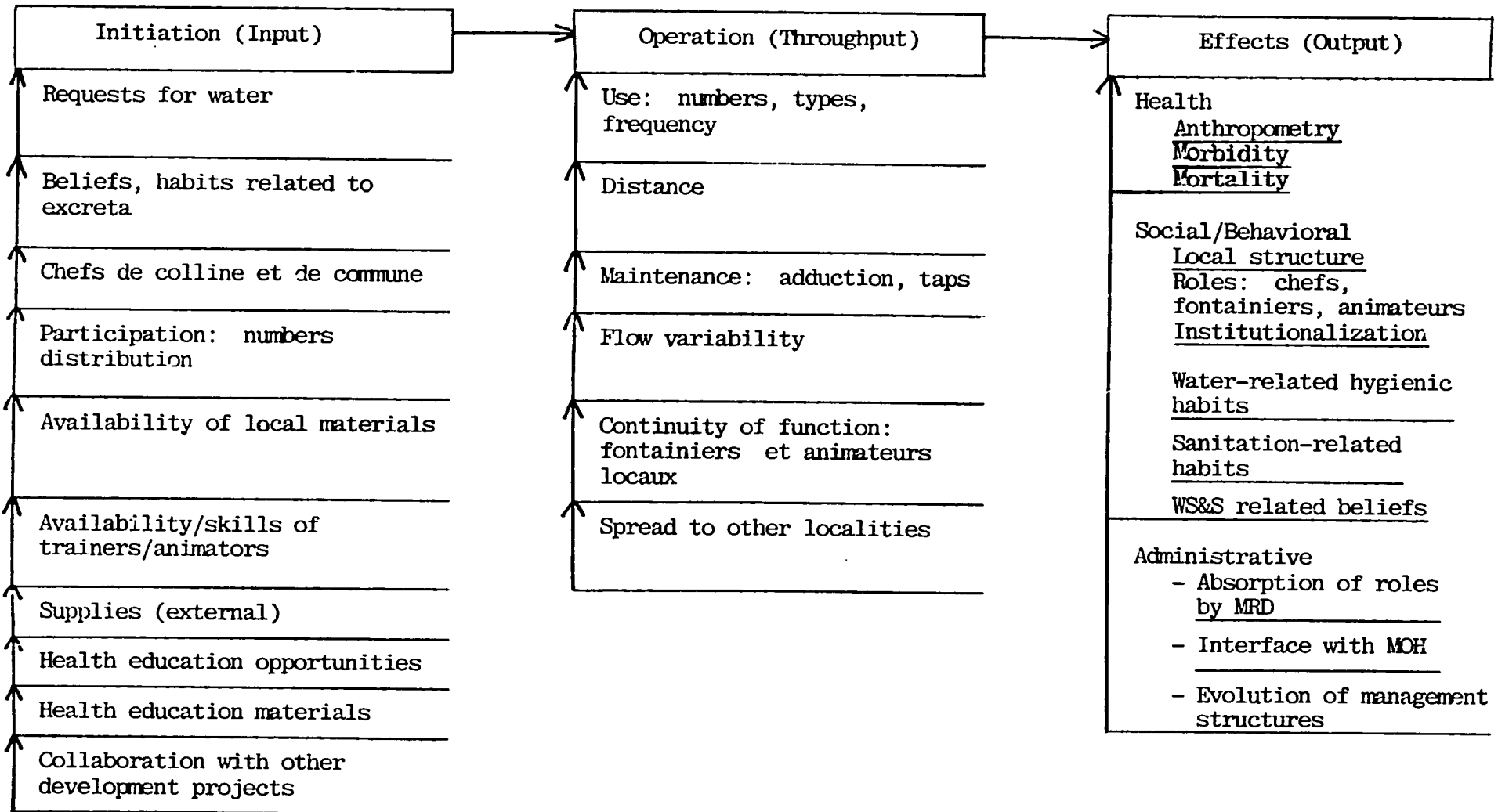


Figure 1. Evaluation Framework

5. Ministry officials: project management questions.
6. Officials of other donors: questions on complementary activities, questions about local participation, overall questions on the Burundi water and sanitation sector.
7. Missionaries: questions about local participation and social/behavioral aspects.
8. Project documentation - all questions.
9. Relevant documentation from other projects provide complementary information.

On the basis of this analysis a series of interviews, field visits and document reviews was established. Persons visited, sites observed and documents reviewed are summarized in the appendices.

## Chapter 2

### OVERVIEW/BACKGROUND

In this section the context in which the UNICEF project should be assessed will be established, namely that of its own development and current needs, and its relationship to what other donors are doing in the water and sanitation sector, to the overall development of the sector in Burundi, and to other relevant rural development programs.

#### 2.1 History of the UNICEF Project

A feasibility study performed in 1977 forms the basis for both the Project Work Plan and the Agreement with the Government of Burundi. This Plan anticipated the capping of some 4,300 springs throughout the country, including the repair of some in poor condition and the construction of 250 kilometers of gravity fed connections to social complexes surrounding dispensaries and health centers.

As of May 31, 1980 over 650 springs had been capped in all eight provinces and in 53 of the 79 communes, and 80 skilled community workers or fontainiers had been trained. Of these 80, a total of 75 were still on the job at this writing. Of that number, 23 had been taken up by communal payrolls, 37 were still paid by UNICEF, and 15 were being paid by non-governmental organizations.

The preliminary phase of the project stretched from November 1978 when the Project Director arrived to September 1979, with the arrival of the first materials. This period was necessarily lengthy because of the complex relationships that had to be established with various ministries (Rural Development, Public Health, Social Affairs, and Interior) and the delay in receiving a first supply of equipment and materials.

Other essential preliminary activity concerned the recruitment and training of personnel. Skilled handy men were recruited and trained as trainers. They were made responsible for training community workers to cap springs and for mobilizing local communities in collaboration with the communal administrator. Extension workers were also recruited and given training in communication skills. A total of eight workers in each category were trained but the number has been cut to two extension workers, a foreman, and four skilled laborers because of budgetary shortages. The latter workers are currently working on three dispensary gravity schemes, the first to be undertaken.

Although the feasibility study called for dispensary gravity flow systems as a first priority, small community spring cappings, it soon became apparent, offered distinct advantages as

initial project undertakings. First of all, the per unit cost is much less than that of a gravity scheme (\$188.00 per spring compared with \$661.00 per kilometer of a gravity scheme). When it became obvious that the promised Canadian funding of the project was going to amount to only a single grant of \$361,000 and that the rest of the financial support of the project would have to come from UNICEF program funds, it was decided that the lower cost, more quickly realized spring capping approach would probably bear more fruit in the beginning than investment in only a few more costly gravity schemes. In fact, it has been possible with the meager funds available to keep the communal fontaniers supplied, supervised and occupied, to the extent of more than 650 springs spread across all eight provinces.

Secondly, these small spring cappings provide an avenue for local participation that the larger gravity schemes do not. For each capping the project must depend upon local officials of both the administration and the Party to help mobilize the people to provide materials, labor and long term maintenance. Because of Party discipline in enforcing the Saturday public work day and other aspects of the program, local cooperation is usually assured.

Thirdly, the technology involved in capping a spring for local community use does not usually go beyond the capacities of the fontainiers. It becomes a project that he can complete with local participation and take pride in, and thus a source of morale building.

Certain criteria must be fulfilled in order for a spring to be capped:

1. The population must collect water at the particular spring and must have requested the capping.
2. The spring should be situated near a center of social activity.
3. The minimum flow (measured) must be at least 0.05 liters per second and must cover the needs of the population.
4. The spring should run continuously through the dry season.
5. Spring capping must be technically feasible.

The first springs were capped in the lowland areas along Lake Tanganyika and in the Ruzizi plain where cholera is endemic. Three hundred and thirty-one springs were completed there by the end of October 1979. The project spread thereafter to Buzanza and Muramvya provinces and then to the rest of the country. The opening of the first spring was presided over by the President of the Republic on October 15, 1979.

When supplies and equipment are regularly available, the project anticipated the capping of 2-1/2 springs per fontainier per month. The Uganda War delayed delivery of the first shipments of supplies and vehicles, bringing about a delay in initiating the project as a whole. Recently, an unexplained failure of materials to arrive from the UNICEF Regional Office in Nairobi has slowed down progress.

Most communal administrators have prepared and submitted tables listing the springs to be capped, those in good repair, and the number of potential users, all by colline. The choice of springs to be capped appears to be based on requests by the local people to the administrator and the latter discussing the matter at weekly and trimesterly meetings with administrative and party officers.

More recently three potential gravity schemes have been studied with work beginning on two. Plans call for an eventual 250 kilometers of gravity adductions serving primarily dispensaries, health centers, and social centers, but secondarily entire complexes of social activity surrounding these service centers as well as the surrounding populations who could benefit from public tap connections. Many of these schemes are needed at mission complexes. For some areas, rain catchment will offer a better alternative. In these cases there may be no spring of adequate flow within a reasonable distance (5 kilometers) and at a sufficient elevation above the complex to be served.

Looking to the future the project director has hired a national associate who is learning both the technology and the principles of management of personnel, logistics and the complex relationships with government. Eventually the liaison between the project and the Department of Rural Water and Electrification of the Ministry of Rural Development must be strengthened and means found for the project to be incorporated into that Department.

## 2.2 Needs of the Project

The cost of the UNICEF project was estimated in 1977 at \$4.2 million allocated as follows:

1.	Capping 4,300 springs	\$1,581,100
2.	Providing water to dispensaries:	
	(a) New gravity schemes	1,515,700
	(b) Repair of existing gravity schemes	726,800
	(c) Rooftop catchments	<u>341,800</u>
		\$4,165,400

To date the following funds have been made available to the project:

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>Total</u>
UNICEF	358,000	---	130,200	488,200
Canadian International Development Agency (CIDA)	300,813	---	---	300,813
Government of the Republic of Burundi	8,511	30,845	167,504	206,860
United Nations Capital Development Fund (UNCDF)	---	---	691,000	<u>691,000</u>
				\$1,686,873

The UNCDF commitment has been made in principle, but funds have not yet been made available. The actual expenditure to date is estimated at \$800,000. It is expected that UNICEF and GRB funding will continue at roughly the same levels for the remaining three years of the project. Assuming these levels and no additional donor funds, the net shortfall is roughly \$1.6 million. In actuality some additional donor funding may be made available. The World Bank Kirimiro project may, for example, provide \$200,000 and the Finnish International Development Agency (FIDA) a similar amount. AID has been requested to provide \$500,000 during FY 1982, which would enable the project to accelerate its rate of completion of spring captations and gravity systems.

In addition to the financial constraint in the project, the major constraint has been establishment of a dependable supply line. To date commodities have been ordered through UNICEF's office in Nairobi, and Kenyan manufactured goods have been supplied, with delivery hampered by a number of factors including the difficulty of transiting Uganda. The project requires a dependable source of supply. Alternative sources should be investigated.

A further need of the project is additional staff. The original design called for two expatriates. To date the project management has consisted of one expatriate and one Burundian counterpart. A volunteer priest has recently been providing surveying services. These personnel have functioned admirably. However, for the project to expand, particularly on the gravity systems, an additional staff engineer should be recruited. This individual would perform necessary field and design work associated with the gravity fed systems, thus freeing other staff for expanded roles in monitoring the spring program, training, logistics and reporting.



### 2.3 Other Donor Activity in Rural Water Supply and Sanitation

Donor activity in the water supply sector in Burundi is concentrated on population centers. The major Burundi government organization involved in this effort is the Corporation for the Supply of Water and Electricity (REGIDESO), a semi-autonomous corporation of the Ministry of Energy and Mines. Presently REGIDESO is responsible for the water supply systems of the two main cities of Bujumbura and Gitega. With German technical assistance the corporation is working on a renovation program of water supply for secondary cities which include Ngozi, Kirundo, Muyinga Ruyigi, Rutana, Bukinasazi, Bururi and Rumonge. A second phase of this project includes nine additional towns. The German assistance program for Bujumbura includes granting 150 million German marks for expansion of the distribution network and treatment plant and pumping station capacity. The secondary cities project is estimated to cost one million dollars with funding provided by German Technical Assistance and the African Development Bank. With the completion of the program estimated in 1984, all towns in the country with populations exceeding a certain level will be served with potable water.

The second organization involved in water supply is the Département d'Hydrauliques Rurales et Electrification (DHRE) (Rural Water and Electricity Department) of the Ministère de Développement Rural (Ministry of Rural Development). The Department is responsible for maintenance of existing rural water systems and construction of new systems, particularly the supply of water to new villages formed as a result of the government resettlement program. The Department is assisted by Belgian bilateral aid which provides two expatriate engineers (one in water supply and the other in electricity supply) and a modest budget for equipment and logistical support. A World Bank financed project for the renovation of 46 rural water systems is being managed by the department. A consultant has been selected to prepare feasibility studies for rehabilitation of 36 gravity and 10 pumped rural water systems.

Belgian bilateral assistance has been provided for a number of individual projects which fall under the management of the DHRE. In the Rugari area in the north of the country, a 20 kilometer gravity system is under construction by the DHRE to serve 2,000 residents at a cost of 36 million Burundi francs (90 francs = US\$1.00). A 15 million Burundi francs project to serve Mugano in the northwest is being constructed by a French firm. A drilling program to provide 43 handpump equipped wells in the Gihozi area and the Imbo plain area is being funded by the Fonds Européen du Développement (FED). The Association Internationale du Développement Rural (AIDR) is the contractor for the drilling program as well as a recently completed large rural gravity system funded by Belgian aid in the Ruzizi Delta north of Lake Tanganyika. This project is to serve 4,400 families with 102 public fountains.

AIDR is a Belgian based non-profit engineering firm. During pre-independence times, AIDR, then known as FBI (Fond du Bien-Etre Indigene) was the major organization involved in rural water activities. Over 80 pumped and gravity systems were constructed and maintained by AIDR, and approximately 4,500 springs were capped. The evaluation team observed numerous FBI cappings still in operation after an average of 20 years of service. The pumped and gravity systems were turned over to the DHRE in 1978. These systems have suffered from lack of maintenance due to inadequate budget. Presently the DHRE budget is not broken down into categories such as maintenance, and in practice virtually the entire budget is allocated to construction of new systems. AIDR continues to be active in the water sector, acting both as a consulting engineer and as a construction and well drilling contractor.

The International Labor Organization (ILO) is implementing a labor intensive public works program with Danish, German, Dutch and OPEC assistance. This program has included construction of several rural gravity fed water systems in support of the village resettlement program. These projects have been undertaken with self-help labor for the spring capping and paid labor for other works. Foremen for these projects have been trained by the UNICEF project.

Various integrated rural development projects have been designed which are dependent upon the UNICEF project for provision of water supply in rural areas. The World Bank financed projects in Muyinga, Ngozi and Kirimiro areas serving a total of 38 communes contain statements in the project documents to the effect that the UNICEF project will provide improved rural water. The Kirimiro project includes a budget item of \$200,000. An ILO cooperative project is also reliant on the UNICEF effort.

In addition to major bilateral and multilateral donors, a number of non-governmental organizations are active in the rural water sector. Action Aid is a British charitable organization active in rural development in Burundi. Schools are used as a point of introduction into the community, and the agency has contacts with 100 schools in rural areas. Seven fontainiers who have been trained by the UNICEF project are employed in a spring capping program. Some problems have been encountered in mobilization of self-help labor, and the rate of completion appears to be considerably less than that of the UNICEF project. CARITAS, a Catholic organization, also works in capping springs using fontainers trained by UNICEF. This effort has also included education in sanitation and hygiene and encouragement of the local population to construct pit latrines.

## 2.4 Overall Development of Burundi Water and Sanitation Sector

The Government of Burundi (GRB) has stated its commitment to improve the health and quality of life for rural populations and the importance of developing water supply and sanitation facilities. After several meetings over a five-year period, there remain differences between action plans proposed by the National U.N. Water Decade and Donor Action Committees. GRB wants commodities and general funds to operate its programs. The donors continue to suggest specific programs, projects and goals. Therefore, an Action Plan has yet to be submitted to the U.N.

At least two projects, both rural and national in scope, satisfy the Decade goals for improving water supplies. The UNICEF spring capping project will affect 10 to 20 percent of the population. In addition, a four-year feasibility study has recently been started at a cost of Burundi francs 36 million for the rehabilitation of 46 water distribution systems in rural centers. The study is funded by the Belgian Government through the Ministry of Rural Development and is being performed by BCEOM, a French firm. This schedule must be stepped up, however, if improvements are to be realized by 1990.

The GRB has established within the Ministry of Health a Department of Hygiene and Sanitation which is receiving technical assistance from a Belgian doctor and a WHO sanitary engineer. Sanitary technicians and assistants are trained, but absorbed into the hospital system rather than directly affecting the population. There has been a hygiene education radio program which promotes latrine building since the 1977 cholera epidemic. There are currently two Belgian latrine construction programs in Ruvironza and Kisinu.

## 2.5 Other Relevant Rural Development Programs

Any project of this scope needs to be assessed in the context of its relationship with other development projects, especially those affecting the institutional structures of rural areas. Furthermore, water and sanitation programs are by their very nature inter-disciplinary, requiring cooperation and collaboration at all points along a vast spectrum of inputs to assure project success.

Three rather large projects which address general developmental problems were considered:

1. The World Bank funded integrated rural development projects operation Ngozi, Muyinga, and in the Kirimiro zone.
2. The cooperative movement including the ILO cooperative project.

3. The ILO supported demonstration project of labor, intensive public works in Muramvya.

Each of these projects will be described in terms of its relevance for development in general and its specific relevance to water supply and sanitation programming. What is remarkable at the outset, however, is the interface with the UNICEF project that characterizes each one. Each project depends in fact on UNICEF for its water and sanitation component.

#### 2.5.1 World Bank Funded Integrated Rural Development Projects

These projects are operated by the Rural Development Corporation (RDC) created to provide personnel, organization, participation of local leaders, and thus a framework for development efforts. The more specific objectives of these projects include:

1. Improved productivity of the holdings of small farmers through strengthening agricultural extension services and implementing erosion control measures and thereby increased food production and income.
2. Improved rural living conditions through protection and maintenance of water sources, the equipping of social centers, and the development of wood resources.
3. Improved quality of coffee crops through the building of washing stations.

Programs components include:

- a) Extension and other agricultural services for coffee and food crop production.
- b) Construction and operation of coffee washing stations and hand-pulping centers.
- c) Afforestation and erosion control.
- d) Selective improvement of roads and bridges.
- e) Improvement of rural water supplies.
- f) Pilot activities in improving agricultural production and rural living conditions.
- g) Studies, research, and project monitoring.
- h) Staff training.

Regional Development Corporations have principal responsibility for operating the project (components a through e and h above). They will be related to the Ministry of Agriculture and Livestock for general supervision and will absorb the staff of the Ministry in the project areas. Each RDC would have a Board of Directors made up of local administrative authorities. The Board would review and approve annual work plans and make operational decisions.

Financing of the RDC is to be in the form of grants from World Bank credits and Government funds and credit obtained from a parastatal company with government guarantees.

In addition to the operations mentioned above, the RDC would also assist existing cooperatives in project areas with credit.

The projects will depend on the UNICEF project for water and sanitation activities.

#### 2.5.2 The Cooperative Movement Including the ILO Cooperative Project

The Government has given support to cooperative development since 1976. Responsibility for all activities falls within the Cooperatives Department of the Ministry of Rural Development. The emphasis of this department is on training staff. There is a cooperative training center. Cooperatives may be supported either by religious groups or by the Government. Thirty-seven cooperatives with about 10,000 members, have been started by religious groups. They are grouped in the Fédération des Coopératives Populaires du Burundi(FECOBU), a cooperative union formed in 1975. FECOBU member cooperatives operate stores where essential items are sold at low prices and food crops are purchased from farmers. These crops are resold at below market prices. Additional services include those of a clearinghouse and assistance to members in accounting and management.

Government sponsored cooperatives are mostly financed by bilateral and multilateral organizations. They follow the same pattern as FECOBU members.

The ILO sponsored project in Ngozi province is an example of one such effort. It is in a three-year experimental phase in which the emphasis is on establishing cooperative stores where basic food products can be bought and sold. This experimental phase will last until 1983.

Problems addressed by the project include the insufficiency of commercial activity in the interior of the country and the difficulties of marketing local products.

Major objectives are the creation of 150 cooperative stores, of which 80 now exist, a national buying center with importation capacity, and the establishment of a branch for the commercialization of food products. The latter two objectives have yet to be realized.

Other activities of the cooperatives include the marketing of technology for both agricultural and household use among members and the promotion of women's roles. The latter is implemented by having women participate actively in certain cooperative activities related to the sale of household items and the promotion of vegetable gardening.

Water and sanitation activities are foreseen, but, except for the buying of materials, the cooperatives will depend on inputs from the UNICEF project.

### 2.5.3 ILO Public Works Project

The third project having important implications for the structuring of water and sanitation activities is also experimental in nature.

In this project wages are paid to workers recruited locally to work on locally defined projects. Prior to the project a survey was made to determine (1) what wage level would be acceptable to most potential workers, (2) what project(s) is/are most desired by the population, and (3) the number of skilled workers. The project has worked exclusively in Muramvya Province. Three communes became the project sites. Projects are identified by the collines and include:

<u>Project</u>	<u>No. collines Identifying</u>
1) Spring capping and gravity systems	44
2) Road improvement	25
3) Swamp and stream management	11
4) Afforestation	8
5) Storage buildings	7
6) Animal feed centers	2

Other collines requested tribunals, dispensaries, schools, and dipping tanks, all of which fall outside the capacities of local populations.

The ILO project, scheduled to end in February 1982, has completed most of those activities. Meetings were held with local administrators to set objectives. Training courses were held for communal administrators, party secretaries, and agricultural agents and their assistants. Work teams were organized under local team leaders. Help was sought from the UNICEF project for spring cappings.

In February 1982 when the first phase ends, the communal administrations are supposed to take over all aspects, including the financing, but it is estimated that only one of the three may be able to do so. In other cases cooperatives may be able to build on what has been accomplished. A larger five-year project is scheduled to begin in 1982. It will be managed by three ILO technicians and their Burundian counterparts.

These three projects offer some important insights. First, it is evident from the last project that when local populations are given a chance to select priorities, water supply takes an important place. The cooperative movement, including the ILO project, illustrates the possibility of organizing rural Burundian populations into operational structures when it is in the interest of the people to do so. In areas where cooperatives exist, they should be used to provide a framework for both the installation and maintenance of springs. They may also serve to purchase cement, PVC pipe, plastic sheets and other material thus making unnecessary the financing of a part of these commodities from outside funds. Lastly, the World Bank projects offer an opportunity to see how well local administrative officials can manage a multifaceted set of activities thus improving insight for the future, when water and sanitation activities may be a part of a more comprehensive approach.

## Chapter 3

### EVALUATION FINDINGS

As indicated earlier the UNICEF project as the focus of the present evaluation will be assessed from three angles: (1) program inputs, both material and human; (2) program operations, both technical and managerial; and (3) program effects in various categories. Since the project has been in operation for only 21 months, most of the findings will be in the first two categories with little in the third. Also, since spring capping has been the principal and nearly the only activity to date, the evaluation will target that activity for detailed analysis.

#### 3.1 Program Inputs

##### 3.1.1 Commodities and Budget

The feasibility study prepared for the project included detailed commodity estimates and costings for both the dispensary water supply and spring captation programs. These estimates have proven to be valid in terms of quantities and costs. Costs are accurate to the present. However, an additional inflation factor of 15 percent per annum should be included for the remaining years of the project.

##### 3.1.2 Technical Design and System Costs

Several designs are used for the development of springs for potable water supplies. The variations largely depend on the following factors:

- intended benefits and uses
- lifting and distribution requirements
- size and variability of discharge
- flow control (values, restrictions, etc.)
- excavation, source protection, durability and maintenance requirements
- quality, e.g. potability, corrosivity and sediment loads.

UNICEF has selected the least complicated and most practical of these variables so that the members of the colline to be served may more readily participate in the development of reliable, low-cost systems (averaging less than \$10.00 per capita). Free, improved water supplies with non-moving, but durable, components and the lowest possible maintenance requirements are offered in exchange for local materials and labor.



This plan is very suitable for rural conditions in Burundi, capitalizing on motivation through the communal organization, and initially avoiding the need for development of regional repair and maintenance capability.

Claude Massar, the Project Director, was formerly with AIDR in Rwanda where over 5,000 springs have been capped with practically the same design. Mr. Massar will inquire at UNICEF/Nairobi and AIDR/Rwanda regarding performance of an evaluation in Rwanda and project status.

Three types of systems are being proposed and developed for the UNICEF project: spring-capping, spring-fed gravity distribution systems and rain-catchment cisterns as shown in Table 1. The first has been the most successful and prolific to date. Over 600 of the project's 4,300 systems have been completed. In his 1977 feasibility report Massar identified 4,300 FBI systems in need of repair and estimated a demand would be generated for 4,500 new spring-cappings. Massar has developed for the project: a standard design (similar to Rwandan AIDR) for hands-on training of fontainiers and methods to motivate the local user populations. Throughout Burundi various types of water supply systems are used including springs where they exist and wells and cisterns in the plains and drier areas. The spring capping program utilizes by far the fewest resources per capita served (see table below). It requires the shortest time period for completion of a system (3 to 4 weeks), and requires only basic technical skills, minimal maintenance and maximum user participation.

TABLE 1. Costs of UNICEF Water Systems  
(in US dollars)

<u>Systems</u>	<u>Unit Cost</u>	<u>\$/capita</u>
Spring capping	200-400	2-10
Wells	11,000	50-100
Spring-fed distribution systems	35,000	50-200 (highly variable)
Cisterns/roof catchments*		
a. roof improvements	13,000	50-350
b. gutters and cistern only	314	3

\*Implies using roofs of several buildings in a social complex.

Wells have not been widely developed in Burundi. AIDR has purchased three percussion drill well rigs. One is new. The older rigs are now operated by the Ministry of Rural Development. Average well depths are 20 to 30 meters. A Chinese bucket belt and French foot pump are being field tested for lifting water. Fifteen handpumps are being installed by MDR/DHRE for wells recently drilled in the Mosso region in southern Burundi.

Massar identified 25 dispensaries which would not qualify for gravity distribution schemes but could be supplied marginally by roof catchment of rain and cistern storage. Annual rainfall averages 1,500 to 1,800 millimeters. Average available roof surface areas for dispensaries are about 150 m<sup>2</sup>, which would provide about 1.8 m<sup>3</sup> or 1,800 liters per day (lpd) based on 100 days of rain per year. Massar's dispensary demand estimates average 1 to 2 m<sup>3</sup> per day, with costs ranging from \$50 to 350 per capita (based on 15 liters/capita/day). However, if roof catchment is selected for only those of the 25 dispensaries with sound, existing corrugated roofs, the costs per capita could be quite reasonable. The cisterns could be constructed locally, at less expense with a 5 to 10 day capacity, i.e. 10 to 20 m<sup>3</sup>. Many problems with construction techniques and training will have to be overcome before the roof catchment improvements became viable. In the rainy season, individual rain catchment systems of 5 m<sup>2</sup> would provide up to 60 liters per day. Hand built flat shallow ceramic containers could be developed locally by fontainiers.

To date, there have been no user charges for water supplied to rural areas. Furthermore, the Department de Hydrauliques Rurales et Electrification (Department of Rural Water and Electricity) pays for the installation of such systems. In contrast, Massar's concept of requiring in-kind payment (i.e. that potential users supply and transport locally available materials and provide all unskilled labor) is setting a valuable precedent for communal self-help resources development.

### 3.1.3 Training of Personnel

All training has been on-the-job. Three categories of personnel have been trained:

- (1) Chefs de chantier and moniteurs (foremen and skilled workers)
- (2) Animatrices sociales (social work aides)
- (3) Fontainiers communaux (skilled local spring technicians)

The first two categories of workers have been trained to train the third. The skilled workers/foremen have also been trained to work on gravity schemes, while the second category include among their skills working with local leaders to mobilize the populations to provide labor and construction materials.

Training of fontainiers takes place in four week seminars. They are selected by communal authorities. The training period consists of one week of theory and three weeks of practice in which the principles of capping the spring, laying the pipe, making maximum use of the slope and doing the masonry work are taught in field situations. Some training in communications skills and group work is also included, but is minimal.

To date 80 fontainiers have been trained of whom 75 remain on the job. Thus there is one for almost every commune.

This particular program input is one of the strongest of the project. Most of the trainees selected are men who speak no French, but only Kirundi, the local language. Some have worked in the past with the FBI or with AIDR, FBI's successor. The method of selection is sound. The workers are selected by local authorities on the basis of their perceived competence and their respect by the population.

The training seems to be of the most appropriate type, minimizing the theoretical and emphasizing hands-on, job specific skills. The addition of some well designed training manuals could be helpful as could be periodic redesign of the course based on the inputs of experienced fontainiers concerning the problems they have met and the methods they have used. Some built-in incentives such as a bicycle given after one year of maintenance and good work would also be in order.

A particular weakness seems to be the community mobilization content of the program. How to work with pipes and cement is emphasized to the exclusion of how to work with people, particularly in reference to maintenance of the spring. This aspect of the work is frequently assumed to be the responsibility of someone else. The role of the fontainier in this regard needs to be more clearly defined and training redesigned accordingly.

#### 3.1.4 Population Mobilization

The major objective of this input is to stimulate the population that uses a particular spring to participate in the provision of labor for digging the trench and the circumferential protective gutter, cleaning away brush and mixing the cement, and to provide required local materials such as sand, clay, gravel and stones. They are also called on to carry UNICEF cement, pipes and plastic sheets from the delivery (usually the communal administrative post) to the spring site.

Mobilization has its base in the felt need of most population groups for fresh accessible water. Although convenience is the most frequent criterion in the choice of a spring, the evaluation team did learn of instances in which a particularly contaminated or dirty spring, or one that diminishes markedly in

the dry season, would be passed up for a less convenient but fresher and more reliable source. These aspirations for a clean, reliable, accessible source of water have been further stimulated by several years of health education efforts at dispensaries, health centers, schools and social centers as well as on the national radio.

Many requests for spring improvement are made by the people to the communal administrator. Once a fontainier becomes installed in an area, these requests multiply.

Three persons are essential for the mobilization of the population:

- (1) The communal administrator
- (2) The first secretary of UPRONA (the national political party) at the communal level
- (3) The fontainier

The communal administrator convokes the population through his authority over the administrators of the collines (the basic census unit) and those of the sous-collines (see Figure 2). Two visits are made by the project to the administrator. At the first, the objectives and the obligations of various parties in the project are explained. His role in mobilizing the population and his responsibility for UNICEF materials and for paying the fontainiers is underlined. At the second meeting the administrator calls a meeting of the heads of zones (subdivisions of communes), communal advisors, and communal party officials. Again the objectives of the project, the obligations of each party, and the role of the fontainiers and their relations with the population are explained. Emphasis is placed on the need for the whole population to continue working until the task is done, that they should work in teams, and that the work on the spring should take priority over the usual communal works scheduled for Saturdays. Lastly, it is requested that the advisor of the sous-colline where the spring is being capped participate personally in the work.

UPRONA has a well organized structure to the sous-colline level (see Figure 2) where the basic unit of the Party, the cell, is found. The Party has therefore a profound influence on both political and social life in Burundi. Any effort at population mobilization must depend on party initiative. The President of UPRONA, who is also the President of the Republic, has demonstrated his support for the project by inaugurating the first spring. Contacts have been made by project personnel with every level within the Party.

The fontainier plays the role of coordinating the work by populations mobilized through the communal authorities. Their role must be underscored by the communal administrators.

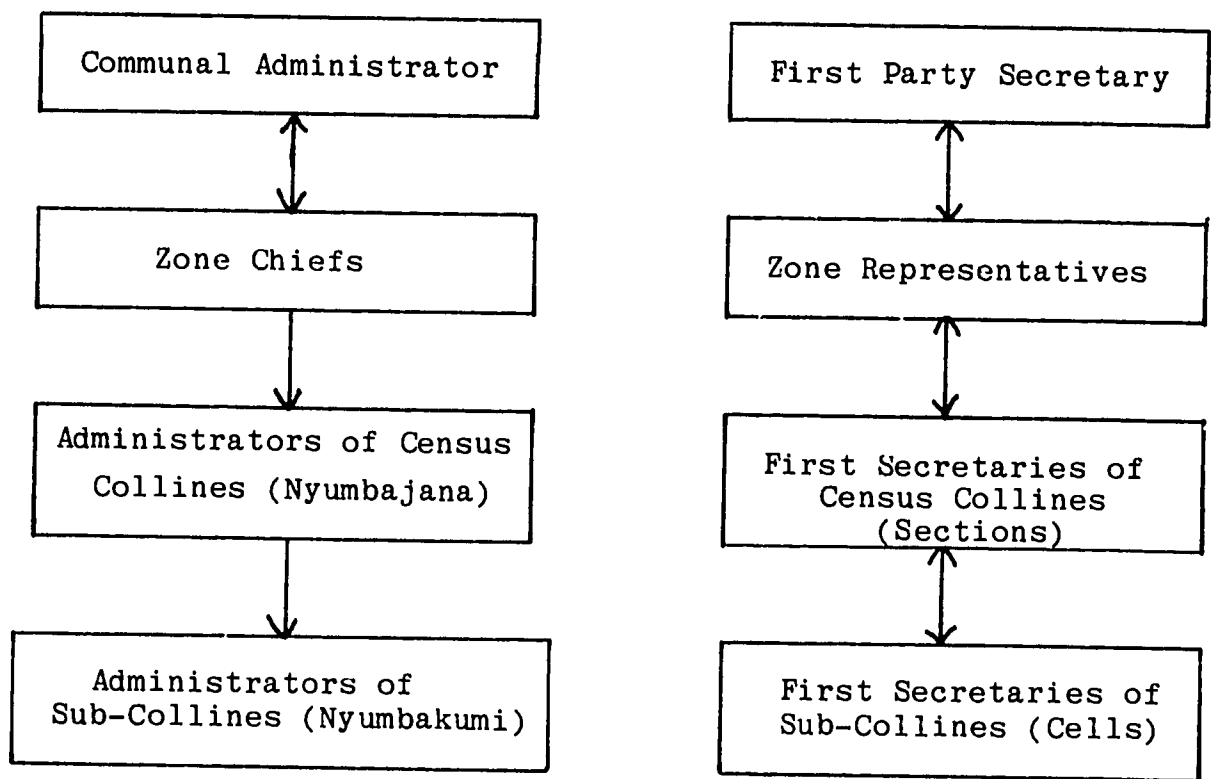


Figure 2. Administrative and Party Structures at the Communal Level

Mobilization efforts are coordinated at meetings held three times a year attended by the communal administrator and all the authorities, (administrative and Party) from every level. At these meetings, requests for spring cappings are discussed and ranked and instructions are formulated and passed on to those responsible.

The evaluation team was positively impressed by the appropriateness of the efforts to bring about popular mobilization. No administrative channel had been short-circuited in the effort to reach the people. Party and administrative authorities had been pulled in at every level. In most cases, the effort has paid off handsomely.

Too little attention has been paid, however, to organizing local popular responsibility for the long term. Maintenance of the spring should be, for example, the responsibility of a local person. In addition, repairs should be anticipated and someone made responsible for contacting the fontainer. More use should be made of the water promotion program to promote the latrine program already being promoted by communal administrators. Behavioral change is always more likely to occur when it is promoted in a supportive social structure. Some of this responsibility could fall on the fontainier if he were given proper training. Other aspects of the program should focus on women and most appropriately through a woman such as an animatrice. A possible stimulus to continued mobilization might be to set up competition among sous-collines for the best constructed/maintained spring or among communes with the most capped springs.

### 3.1.5 Infrastructural/Institutional Development

Since its inception, the project has not been operated directly under a government ministry. Rather it has operated independently but in close cooperation with relevant ministries including Ministries of Interior, Health, Rural Development and Social Affairs. The project's primary contact with government, however, is at the commune levels which depend on the Ministry of Interior. The communal administrator is responsible for all aspects of the spring capping program in his commune, including selection of springs to be capped, day-to-day supervision of fontainiers, warehousing materials, and certification of completion of spring captations. This organization is perceived as a key ingredient of the project and is an interesting approach for working around weak or heavily bureaucratic government organizations. The project has, in effect, institutionalized itself at the communal level by providing fontainiers for almost every communal administration. Fontainiers are paid by the project for their first year of service, after which their salary is assumed by the commune. Although some problems have been encountered, the effort has generally been successful. A major point is that the project

has been able to install the fontainier within an existing supervisory framework without burdening the project with additional middle management personnel which may have been required had a traditional ministerial mode been followed. Because of the lack of such personnel in Burundi and the logistical requirements of setting up such a network, the decision to work through the communal administrators appears to be a good one. It is suggested, however, that some seminar training or other management resources be offered to communal administrators as discussed elsewhere in this report.

The second component of the project, which is to provide water supplies to dispensaries, is still at an early organizational stage. This component requires greater maintenance and technical skills, both by the chef de chantier (foreman) and his supervisor. To date only a few foremen have been trained. The supervisory staff consists of the Project Director and his counterpart who have many other duties. Although this component is also tied in at the communal level, the administrator's role in this case is limited basically to providing self-help labor. The institutional framework for this component would appear to be more appropriately placed within a traditional government ministry, especially if maintenance is to be assumed by a central authority.

The Rural Water and Electricity Department of the Ministry of Rural Development is involved in establishing effective construction units as well. Rather than duplicate their work, it would appear most effective to cooperate more closely with its department with the eventual objective of integrating the UNICEF dispensary program into it. Current problems within this organization related to budget, personnel and logistics, are beyond the financial scope of the envisioned aid project. It is, therefore, not recommended that this institutional issue be addressed at this time.

### 3.1.6 Sanitation and Health Education Inputs

Little has been done by the project in either sanitation or health education. reliance has been placed instead on promotional activities at dispensaries, schools, social centers and through the radio. There has been an active latrine program in many communes since the cholera epidemic of 1978. Other factors to be considered include:

- (1) Water transport - size and cleanliness of the vessel.
- (2) Water storage - cleanliness of container and cover.
- (3) Water use.
  - a) Obtaining water from the container - cleanliness of dipper.

- b) Drinking cups - cleanliness.
  - c) Washing food.
  - d) Washing clothes - laundry slab attached to spring.
  - e) Washing dishes.
  - f) Bathing - soap?
  - g) Handling waste water.
  - h) Washing hands after defecation.
- (4) Solid waste disposal.
- (5) Excreta disposal.
- a) Men
  - b) Women
  - c) Children
  - d) Infants
  - e) Maintenance of latrines, covering of pits
- (6) In bilharzia prevalent areas - separating populations from contaminated waters.
- a) Bridges
  - b) Washing facilities
  - c) Showers
  - d) Swimming pools
- (7) Attention to water quantity, e.g. rain catchment, lifting devices.

Some of these items, such as rain catchments, fall naturally under the purview of the fontainier. Others, because they are more centered on women or on children should more properly come under the purview of women workers such as the animatrices.

In any case, health promotion efforts should be based on information on existing behavior and beliefs, probably through a survey. The evaluation team was able to find little written material on the subject. This matter will be discussed more in depth in Section 3.3.3.

## 3.2 Program Operations

The following group of evaluation indicators was observed during multiple field visits.

### 3.2.1 Supply and Transport

The normal source of commodities for the project has been Kenya. Kenya produces cement and PVC materials and fabricates steel pipes. The UNICEF office in Nairobi has been responsible for procurement and transport arrangements overland through



Uganda and Rwanda. Commodities are warehoused in Bujumbura and transported to the field by a project truck. Commodity deliveries are based on monthly reports mailed by each communal administrator. These reports simply state the number of springs completed during the previous month and material requirements for the next month. Based on these requests, then, an efficient delivery schedule is developed (see Appendix E).

The major problem with the supply system has arisen between the source and Bujumbura. For a period of several months the project was without cement and the completion rate for springs has been seriously affected. In 1980, a total of 480 springs were completed, while for the first six months of 1981, only 129. Eventually this drop in completion rate is likely to seriously effect the credibility of the project, the morale of the employees and general interest of the population. It is recommended that the project investigate alternative sources of supply. One such alternative is trucking goods from Zimbabwe to the Zambian port on Lake Tanganyika, and from there by ship to Bujumbura, but this route is much longer.

The evaluation did not determine any deficiencies in the internal Burundi delivery system or the commodity request system. Commodities are adequately stored at the project warehouse. At the communal administrators headquarters visited commodities were being adequately stored. The project currently relies on one delivery truck while a second has been out of service for over a year. When the completion rate rises it is expected that the second vehicle will be required. This vehicle should be made serviceable.

No cases were disclosed of blatant commodity abuse. It is likely, of course, that some commodities, particularly cement, do not reach the intended users. However, because of the standardized spring design, it would be fairly evident if inadequate quantities of cement had been used. In one commune Massar recommended to the communal administrator that he replace one of the fontainers. It is felt that at present adequate controls exist on the distribution of commodities. However, further training of communal administrators and additional monitoring by project staff are to be encouraged.

As a contribution to the project, the communes provide local commodities including sand, stone, clay and gravel. Problems in some areas exist with the supply of sand. The topography and geology of the country are such that sand deposits are relatively scarce. Transport of local commodities is not current policy of the project. In some unusual cases this policy may need to be relaxed if it can be shown that sand deposits do not exist within a reasonable radius, say five kilometers, of a spring site.

### 3.2.2 Spring Capping

Once a request has been made and approved by the communal administrator, the technical criteria (see Section 2.1) must be met and several previously discussed processes must be set in motion before capping proceeds. A local volunteer work force must be mobilized and organized to provide labor and material. The fontainier must survey the site, lay out the necessary excavation, and determine the materials needed to complete the first stage. He then requests the standard UNICEF materials needed to cap the spring and requests sand for the concrete spring retaining walls and service block. Management and logistical support for UNICEF-provided materials and technical resources must be properly scheduled to maintain momentum during implementation.

Field visits were made to several springs in the Muramvya and Ruyigi provinces. Site conditions observed included unimproved springs, FBI capped springs in various functional states, and UNICEF springs both completed and in the process of capping. However, these visits were not adequate for the team to evaluate frequency of operational difficulties or construction errors. Of the springs visited, none had major problems and all were functioning and being used effectively by the colline inhabitants. Minor problems encountered with the UNICEF capped springs were omission of cast iron sleeves which protect the PVC spout, inadequate spout height, narrow service block, standing water collecting below spring and in runoff diversion trenches because of clogging vegetation, and sediment loads. The minor problems observed demonstrate the need for training fontainiers in periodic inspection of springs, supervision by the moniteurs, and delegation of responsibility for maintenance of springs and their immediate surroundings or notifying of the fontainier.

Requests were made for laundry areas. Local materials can be readily used to provide clean areas for washing below spring service block. Modifications of present standardized design could include the latter, as well as a better place for setting ceramic pots, wider-angled trapezoidal collection space, and shelving or other aids to lift filled containers to carrying height. CARITAS has developed one design which has been well received by the users. However, it appears too costly and requires as much or more cement than the spring wall. Alternative basin designs using the abundant building stones should be explored.

The Ruzizi commune has been using over 300 UNICEF-capped springs for two years. This area would provide one opportunity to examine durability, discover operational and design problems, survey consumer attitudes, water use and maintenance characteristics, and assess the number of additional requests for springs, retained competence of the fontainiers, sustained motivation of the populations and other related factors.

Capped springs should be monitored for shearing, slippage of the surface soil layer or covering plastic sheet, and undermining of the impermeable clay layer, conditions observed in many of the dilapidated FBI springs.

### 3.2.3 Spring Use and Maintenance

A young woman stands, barefoot, on the wet concrete slab below the discharge. After washing and steadying the container while it is filled, she swings and lifts it (more than 20 kilograms of water plus of course, the weight of the container) onto her head, and typically climbs two or three hundred steps up a hill to her rugo (household).

As reported and observed in the field, from 15 to 40 rugos (100 to 250 persons) use an average spring. Forty liters, 20 liters in the morning and 20 liters in the afternoon, are collected in ceramic pots and other containers by the women and children of each rugo. This amount appears to satisfy most water needs. Estimates of 10 liters for bathing, three times per week, were given by some users.

The springs appear to be used for all purposes, but not exclusively where other sources are more convenient or privacy of the rugo is desired, e.g. there is bathing in unprotected surface waters when returning home from the fields or at the rugo after the chores are completed.

There appear to be no specified water rights issues although one would expect a certain amount of proprietary feeling among the members of the collines who have invested labor and materials in capping their springs when the water supplies of an area dwindle during dry season periods.

Maintenance of the standard capped spring will include periodic removal of vegetation and sediment from the area and re-sloping of the adjacent hillside to prevent seepage, erosion, clogging of discharge and drains, and standing water. This stewardship must be undertaken by the colline as a whole or by a user committee with designated responsibilities.

### 3.2.4 Spring-Fed Gravity Distribution Systems

As discussed before, the UNICEF project plans to complete 250 kilometers of gravity distribution systems which will supply the rural dispensaries and in most cases the other institutions and the surrounding population at each location. The project to date has completed some 30 kilometers of pipelines. The gravity systems generally involve a larger flow and thus a more substantial construction effort is needed to cap the spring, to construct a concrete constant head equilibrium chamber and intake, and to install valving and PVC (or cast

iron, where appropriate) piping. Population clusters (each of about 200 persons) located between the source and dispensary are served when possible with PVC laterals through a restriction valve leading to a 3 m<sup>3</sup> reservoir having a standard gate valve (tap) and concrete drainage trough. Should the tap be broken and remain open, minimal losses are insured by the restriction valve which controls the maximum flow (0.1 liters per second) to the reservoir. Public standpipes serve the central population. Ramps (10 holed, horizontal, perforated pipes with a continuous flow of water) serve the schools, and the dispensary receives a direct supply into the building. A storage reservoir (40-60 m<sup>3</sup>) is constructed at the highest point beyond but near the central service area to balance the system and offer expansion.

Currently Mr. Massar visits the communal administrator, makes an estimate of the demand, measures the spring flow to determine adequacy to meet demand and roughly designs the systems. Topographic surveys are performed by Ministry of Rural Development employees or private contractors (such as the priest mentioned earlier, for example).

As can be derived from the above descriptions, these systems require more sophisticated analysis and resources for their design, implementation and maintenance, especially when compared with the spring capping program. Again Mr. Massar has developed criteria to achieve the simplest designs, i.e., no pumping, (only gravity fed systems will be considered), and a distance less than seven kilometers from source to dispensary. Where dispensaries are located above the only possible source(s), he recommends relocation of the dispensary. Since health facilities are required by law to have an adequate water supply, the location of dispensaries should be carefully considered.

AIDR designed and built most of the distribution systems in the population centers of the country. During the stay of the evaluation team, the Ministry of Rural Development signed a contract with BCEOM, a French firm, to do the feasibility study for rehabilitating 46 of these 20-year old systems. Ten systems require pumping. The Department of Rural Water and Electricity (Ministry of Rural Development) has begun to develop distribution systems for the national village resettlement program. Two are under construction, and three are currently being planned. Site selection criteria appear to be highly variable and subjective at present. Cost per capita for several systems reviewed varied from \$50 to \$100 depending on required length of main and number of users served. Technical and maintenance resources are insufficient. It will require an enormous effort before the Ministry achieves the adequate infrastructure, trained personnel and management capabilities required to carry on a permanent national rural water supply program. The Ministry has between 10 to 20 plumbers located throughout the country who are responsible for maintenance of

the distribution centers. Their current activity level could not be determined but ILO has proposed training an additional 40 plumbers.

Problems with the current designs and projects are multiple: maintenance, commodity supply, increase in demand for supplies after installation causing a shortage, no intake screens or venting, lack of blow off and pressure release valves in the longer mountainous systems, and lack of experienced technicians, funds and logistical support. The need to serve the dispensaries is great but systems should be developed gradually, exploring various alternatives. The proposed visit to the Malawi water distribution system, possible BCEOM training of counterparts, and Massar's gradual training and development of manpower and technical resources should be considered and maintained as options.

### 3.2.5 Roles and Supervision of Project Personnel

Three categories of personnel are operating the project: fontainiers at the base of the operation, foremen and instructors (moniteurs) and social work aides (animatrices) who train fontainiers, and the Project Director and his associate who direct the entire operation.

#### Fontainiers

Supervision of fontainiers takes place primarily through the communal administrator, by means of periodic visits by the Project Director or his Associate, and through monthly reports of numbers of springs capped, registers of equipment received, and orders for material (see Appendix E). Refresher training is forseen for the future, but none has been done yet.

Two fontainiers were observed in the field. One had been trained. Another had not yet been trained. The first exhibited good quality work and excellent rapport with local (sous-coline) authorities, with the communal administrator and with the populations using the springs. The second was doing work of satisfactory quality, but showed an obvious need for more technical training (he will be in the next group to be trained). In addition, he appeared to be more reticent in dealing with the population. It is, of course, possible that training will help to correct this latter deficiency as well.

The rate of 2-1/2 springs per fontainier per month appears to be unrealistic. A more likely figure is that of one a month, since it takes three to four weeks to complete the average spring according to the small number of observations made by the team. Some communes are so large that they require more than one fontainier. In one commune, an aide to the fontainier had been appointed by the communal administrator.

In general, the fontainiers appear to be working well and to be adequately supervised by the communal administrator. Supervision from the project director's office is not practical. Ways must be found to insure the adequacy of supervision at the communal level. Refresher training is badly needed and opportunities should be given for experienced fontainiers to contribute their insights both in refresher courses and in the training of new classes of fontainiers. Two such sessions are scheduled for the next six months.

### Moniteurs and Animatrices

This group of personnel is responsible for training fontainiers. The moniteurs, in particular, train the fontainiers in spring capping and masonry techniques during the four-week training courses mentioned earlier. The social work aides (animatrices), on the other hand, work with the fontainiers in mobilizing the population to supply material and labor and to see the job through to completion. Wherever possible, this team of moniteur/animatrice stays for three months, working with the authorities and the population until a fontainier is selected, in place, and functioning. Fontainiers appear to be selected and trained in other ways, however. Several have been selected directly by communal administrators before the team trains them.

The role of the moniteurs in the technical training of fontainiers is clear but that of the animatrices needs reassessment. At the beginning of the project, there were eight working on mobilizing populations in the relatively small number of communes involved in the project at that time. The number of communes has since grown to 53, but the animatrices have been reduced to two for budgetary reasons. This number is not adequate for the task.

The role of the animatrices needs to be redefined. Rather than doing the actual mobilization themselves, they should train fontainiers and possibly other animatrices to do it and then monitor them through the early stages of the process.

Admittedly such a transformation of roles would be difficult to manage. Social analysis and mobilization skills are more easily performed than taught to others. Training must be almost exclusively experiential as hardly any theoretical generalizations apply. Fontainiers and others should be trained with real-life concrete examples of their future job conditions. An internal operational change critical to long term success would be required.

### Project Director and Associate

The evaluation team traveled extensively with the Project Director, but had little opportunity to talk with his Burundian

associates. The following remarks, therefore, will pertain almost exclusively to the role and function of the project director as perceived by team members.

There is little doubt as to the personal effectiveness of the project director. He was well-received and obviously appreciated by everyone--ministry officials, communal administrators, Party officials, missionaries, fontainiers, and local leaders at the sous-colline level.

This personal effectiveness aside, however, his overall effectiveness is hampered by a supercharged work schedule both in terms of the number and volume of tasks (logistics, report writing, training, supervision, ministry relations, design). As the program expands further, both in the areas of spring capping and gravity scheme construction, this problem will be exacerbated. He relies on his associate for training functions, field visits to spring capping sites, and for contacts within ministries. These functions are all essential, but in the view of the team his associate should receive some short-term training such as a visit to Malawi and the highly successful project there, in order to render him more capable of taking on full responsibility for overseeing the spring capping work.

### 3.2.6 Roles of Communal Authorities

One of the most impressive aspects of the project is its management at the communal level (see Figure 3). The communal administrator appears to be at the center of this management process. He receives requests for spring capping from population groups, estimates the number of springs to be capped (reported to project headquarters), selects, supervises and pays the fontainier(s) (after one year, previous to which UNICEF pays the salary), establishes the order of springs to be capped, and helps to mobilize local communities. He also supervises the distribution of UNICEF materials left at the communal administrative post.

Obviously not all communal administrators carry out these functions with the same degree of effectiveness. Much depends on the personal dynamism and interest of the individual administrator. Most have extremely limited resources in personnel and equipment. There may be no vehicle. Some communal budgets are, however, capable of supporting the work rather generously.

In these functions, the administrator is helped by an array of administrative and Party officials discussed earlier (Section 3.1.4). It is, in fact, through these individuals that mobilization of the population takes place, both in periodic meetings and through visits to spring sites.

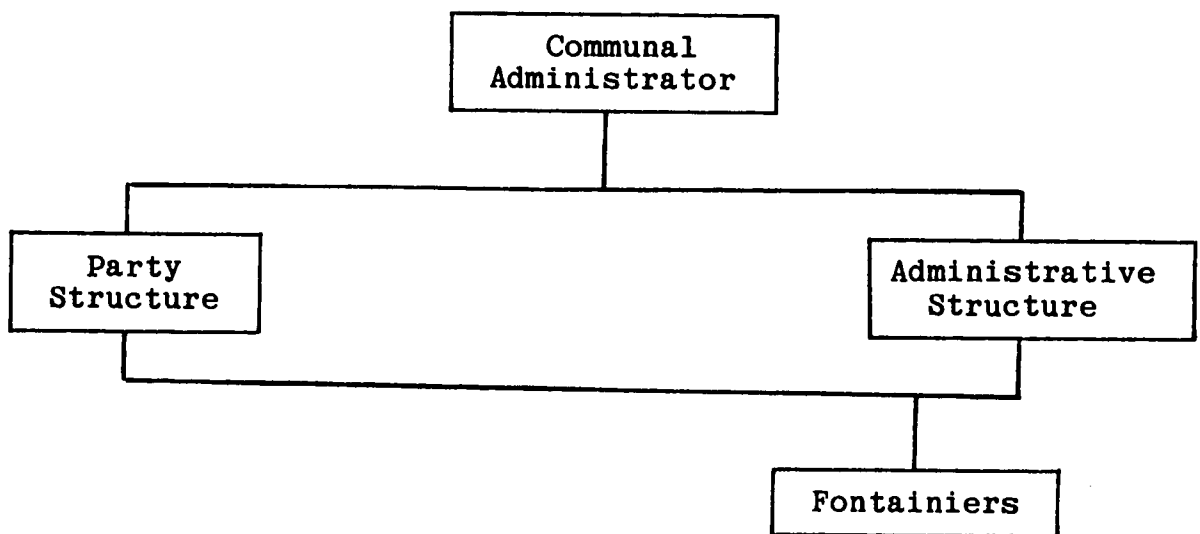


Figure 3. Management of Spring Capping at the Communal Level



The effectiveness of the communal administrators could, however, be enhanced through some training. A one- to three-day seminar, if feasible, held either regionally or in Bujumbura which concentrates on problems in the management of rural water supply and sanitation would be a great help. Individual administrators could bring actual management problems to the seminar to serve as the basis for problem-solving exercises. If a seminar were not an acceptable format for training, a reference manual on managing spring capping could serve as an alternative.

### 3.3 Program Effects

Since the project has been in operation for so short a time, little in the way of concrete effects could be identified. In this section an outline of specific effects that one can expect from the project and the conditions under which those effects can be realized will be presented. Four general categories of effects will be discussed:

1. Water Quality/Quantity
2. Health
3. Social/Behavioral
4. Administrative/Infrastructure

#### 3.3.1 Water Quality and Quantity

Although this project will not shorten the distance required to travel for daily water needs, it does increase access to protected springs with adequate and reliable flows and improved water quality. The selection criteria eliminate seasonal springs and those providing less than 0.05 liters per second. The visible improvement in water quality (especially clarity) and cleaner conditions at the point of collection may set new standards for water use and acceptability among surrounding populations.

Laboratory analysis of water samples collected before and after improvements in other springs have been performed by REGIDESO as a part of the FBI/AIDR program. The results reportedly demonstrated significant decreases in bacteriological counts after capping, with potable sources increasing regularly.

For these benefits to continue, the immediate area, including the spring drainage and watershed runoff diversion trenches must be regularly cleared of vegetation and resloped by the users to prevent root and sediment clogging of the spring flow, surface seepage, erosion, and standing water.

### 3.3.2 Health Effects

It should be made clear at the outset that no measurable health effects can be expected if improvement of water quality at the source is the only project input. Attention must also be given to water quantity and, failing that, at least to water use, especially with respect to personal hygiene. In addition, there is opportunity in the project to exploit the good will expressed by the people to encourage their participation in improving excreta, waste water, and garbage disposal and, thus, to make a further contribution to the likelihood of positive health effects.

If the above conditions are met by the project, then what health effects can be expected and how can they be measured? Three groups of health measures are suggested.

#### Improved Growth Rates of Infants and Children 0-3 Years of age

There is a growing body of evidence that diarrhea may be responsible for up to 90 percent of the growth failure observed in infants and children from 6 to 30 months of age in developing societies. The failure of most supplemental feeding programs to reverse weight faltering trends in this age group, the high prevalence of diarrhea (up to 30 to 40 days/year and affecting up to 80 percent of the small child population), and the known catabolic effects of fever, dehydration, bacterial invasion of the upper gut and protein loss through the intestine all combine to support the validity of this contention.

The measures suggested have above all a direct or indirect effect on the transmission of fecal pathogens. It is this cycle of transmission of pathogens from feces to hands to food to mouth that must be broken if diarrheal morbidity is to be reduced. Water plays an important role in this process by facilitating handwashing, food washing, bathing and personal hygiene. Since infant and child feces are more infectious than those of adults, special efforts must be aimed at improving the handling of their feces and fecally soiled clothing, and especially at providing soap and water for cleansing after defecation. Health education programs in this regard must be aimed at mothers and the young girls who care for small children.

Assuming improvement sufficient to break the cycle of transmission, growth rates in the 0-3 year age group offer an easily obtainable measure of program effectiveness. Specifically, one measures weights and heights of a sample of children along an age spectrum and expresses the values in terms of weight/height ratios. The final results are expressed in terms of the proportion of small children below the 60th percentile for weight/height. Comparisons of populations with and without

program inputs, or before and after comparisons of the same population give an indication of program effectiveness.

The advantages of these measures are that they are relatively easy to obtain for personnel with minimal training, that the measures are concrete, and that, as we have shown, they measure a real biologic phenomenon. They hold a distinct advantage over estimates of diarrheal morbidity, dependent as they are on recall, cultural definitions and linguistic interpretations.

It is suggested that a determination be made of the feasibility of using weight/height data collected at dispensaries that draw from sous-collines where the program has been applied. The disadvantages of this approach would be the difficulty of obtaining a valid and sufficient sample of children subject to project inputs and the questionable reliability of results taken by multiple persons. The advantage is the relatively low-cost of the effort.

If satisfactory data cannot be obtained from dispensaries, then primary data should be obtained, possibly using animatrices from the local center who have training in needed techniques.

#### Morbidity Measures

Most morbidity measures depend upon estimates of specific disease incidence, prevalence, and severity. Since these estimates must be made by trained personnel, dependent in part upon diagnostic procedures, or upon recall by the person, or, in the case of a small child, the parent, they offer little use as indicators of health effects even if program inputs are adequate.

The exceptions would be diseases relatively simple to diagnose such as trachoma, Guinea worm, skin infections (scabies, fungus infections, impetigo), and possibly schistosomiasis. Even these diseases have limited usefulness as indicators if they are not prevalent enough or if project inputs are not sufficient to validate an assumed effect.

In Burundi only skin infections would be useful throughout the country. Trachoma and Guinea worm infection probably do not occur. Schistosomiasis offers some usefulness as an indicator along the shore of Lake Tanganyika, depending on local variations in prevalence and most importantly on whether project inputs include the previously mentioned measures necessary to separate children from contaminated water.

### Mortality Measures

The only mortality measures of any possible use in measuring the health effects of this project would be the infant and young child rates, estimated variously as 120-160/1,000 for infants and 170-290/1,000 for young children. Total mortality for 0-5 years probably varies from 30-45 percent.

These measures, unfortunately, are not useful for valid estimates of the health effects of inputs on small populations. In small populations when mortality rates are high, even a few deaths averted may cause profound statistical changes, not necessarily a reflection of the power of the project to diminish mortality.

It stands to reason however that measures designed to break the fecal contamination cycle if applied widely should have an effect on mortality, since diarrheal disease may be responsible for as many as 30 percent of infant deaths. It is recommended, therefore, that mortality rates be reserved for use when the project has begun to cover entire communes where baseline rates are available.

#### 3.3.3 Social/Behavioral Effects

Behavioral effects are in reality intermediate between operational considerations and health effects. Most of the behavioral changes deemed necessary for health effects to be achieved have been discussed already. They will be discussed here with respect to the conditions necessary for changes to occur.

Behavioral effects are more likely to occur than health effects since they tend to appear earlier in the life of a project, but to measure them requires special survey techniques. Two groups of behavioral effects will be discussed:

1. Water use, transport, storage.
2. Sanitation and hygiene-related behavior.

In addition, two broader categories of social effects will be considered:

3. Group behavioral spin-offs.
4. Economic benefits.

#### Water Use, Transport, Storage

It must be stated categorically at first that no increase in quantity of water used can be expected so long as women and children must walk 0.3 to 0.5 kilometers to obtain it. Casual

observations at several springs by the team confirmed that the quantity per capita remains around 10 liters per day, even at improved springs, and the total quantity carried varies directly with the size of the container and the number of persons per household.

The manner in which water is transported, that is the cleanliness of the vessel, can be expected to respond to appropriate educational inputs. Women are already in the habit of rinsing both the interior and the exterior of the vessel in the spring before filling it.

Water storage is a somewhat different problem. The large vessels in the home are used interchangeably between water and beer. How often and in just what manner they are cleaned is not known, but should be targets of an educational approach.

Of the various uses of water, those for handwashing and bathing are of greatest importance for improved health. Many rural Burundians bathe in a stream or river but an equal number probably bathe at home. Infants and small children are undoubtedly bathed at home. Women often bathe at home if enough water remains. Because of the preference for privacy, the team suspects that most bathing may be at home. One woman questioned at a spring said the quantity she carries each day varies according to whether household members are taking baths. There is apparently a special place in the ruغو for bathing.

As for handwashing it is customary to do so before eating, but almost nothing is known about post-defecation handwashing, about how infants and small children are washed after defecation, nor about handwashing among women during food preparation and handling.

All these types of behavior are fertile ground for education efforts.

### Sanitation and Hygiene Related Behavior

Of greatest importance is the manner in which excreta, particularly those of small children, are disposed of. The team observed many latrines attached to rugos as well as some at markets, schools and public buildings. All were simple pit latrines usually covered by branches with a hole in the middle which usually remained uncovered. The superstructure was of straw mounted on poles or of adobe. Most appeared to be used. Men and women apparently use the same latrine at home. There are no special facilities for small children. Nothing is known about how women manage the defecation habits of infants and toddlers, whose stools are highly infectious.

Other behavior of importance concerns the disposal of waste water which can serve as a highly desirable breeding site for

mosquito vectors, and garbage that attracts rats and mice, carriers of fleas and ticks.

Lastly, and perhaps of greatest importance of all, is the manner in which left-over food is stored. Several studies have demonstrated that contaminated food is probably the primary link for the spread of fecal pathogens from fingers to the mouths of infants and small children. Questions concern whether food is well cooked and covered, and how long it is stored. Bacterial multiplication even after a few hours may be exponential.

All the behavior mentioned above is centered around women and children. Educational efforts should therefore focus on women, especially young mothers and the young girls who also care for children. At this age women are more receptive. Young girls can also be reached through the schools and the social centers.

For educational efforts to be efficacious among women and girls, they must be undertaken by women. The team recommends that efforts be made to recruit animatrices for local social centers to make domiciliary visits and hold group sessions on the themes detailed above. Their program already calls for one day per week of extension work. Arrangements should be made through the communal administrator and the directrice of the local social center.

Some supplemental training of the animatrices in water and sanitation-related behavior may be necessary. As a basis for this training a sample survey of water and sanitation-related behavior, beliefs and attitudes should be undertaken in order to ascertain prevalent patterns that would permit the planning of specific educational inputs.

#### Group Behavioral Spin-offs

The question here is whether the experience of successful cooperative self-help efforts in spring capping result in any further attempts at cooperative undertakings, whether the sous-colline seeks other projects, whether any meetings take place to plan other projects or even the maintenance of the spring. The team found no evidence that any of these changes have taken place in the five to six sous-collines visited, but further inquiry should be made since most sous-collines have not been working on springs very long, and our questions may have been poorly framed, spontaneous as they were.

#### 3.3.4 Any Economic Benefits

No economic benefit can be expected to accrue from simply capping a spring, but the response to a more comprehensive pro-

gram including sanitation and health education might be productive of fewer days lost from labor or school because of less diarrheal morbidity, less money spent on medications or on traditional healers, or possibly greater agricultural production. However, all these benefits are difficult to ascertain and tend to be more long-term.

### 3.3.5 Administrative/Infrastructural Benefits

There are certain specific desired effects of the project which should occur if it is properly managed. Among those effects are:

1. Increasing absorption of project functions by the Ministry of Rural Development.
2. A defined working interface with the Ministry of Health.
3. At the communal level the appearance of effective liaisons among ministerial structures.

#### Absorption by the Ministry of Rural Development

As discussed in Section 3.1.5, little measurable effort has been made to date to integrate the project into a line ministry. It was reported to the team, however, that the project would at some time be absorbed into the Ministry of Rural Development as a department separate from the Department of Rural Water and Electricity. If this were to happen, the effect on the project in the team's opinion is likely to be minimal, providing the existing staff is transferred intact and that the present project counterpart is transferred as head of the department. Mr. Yabukemi, in the team's opinion, has a thorough grasp of the day-to-day operation of the project and with continued expatriate assistance for several years and with the recommended training the project should remain effective. Possible pitfalls are foreseen, however, if (1) a politically appointed department head is named and (2) if staff leave the project because of dissatisfaction with the transfer should it result in reduced salary levels, benefits, etc.

#### Interface with the Ministry of Health

At present, the only interface is provided by the monthly and quarterly reports sent to the Minister and Director by the project director and by local dealings with those in charge of dispensaries and health centers with respect to gravity systems. These relations appear, however, to be purely functional or even perfunctory.

The Hygiene and Sanitation Service of the Ministry of Health is staffed by about 20 sanitary technicians and 80 sanitary assistants. Their training is at the Medico-Social Institute in Bujumbura. Technicians receive four years of training; Assistants three years. The first year of training for technicians is the same as that of medical technicians at the Medical Institute at Gitega. All but the last year for both categories is theoretical. The last year includes field work, mostly in hospitals but also in the installations of other Ministries (Rural Development, Agriculture, Public Works and Mines).

After graduation, these workers are assigned to hospitals and health centers where they tend to disappear in the complex of curative medical work. Occasional attention to markets, schools and occupational safety is given. Health education campaigns are mounted, especially via the radio which appear to have been effective. The personnel, however, do not appear to have much of an impact outside population centers. Problems of transport, materials, and domination by physicians all combine to render them generally ineffective even in the hospitals where they are located.

It is not surprising therefore that no interface with this professionally important service has been established. Definite efforts should be made to contact communes where these personnel exist. Inviting them to participate in training fontainiers might be a first step, or possibly evaluation of sanitation efforts of fontainiers and animatrices. With such carefully planned steps, working relationships may slowly appear in some areas.

#### Communal Level Liaisons

At least four ministries are potentially involved to some extent in the operation of the project and eventually in the absorption of its functions:

1. Rural Development
2. Interior
3. Health
4. Social Affairs

With proper management the project should steer towards an arrangement whereby the communal administrator retains authority for coordinating the spring capping and associated health education and sanitation efforts, using inputs from Social Affairs and Health as necessary. For gravity fed systems it is hoped that the communal administrator will move toward a liaison relationship with Rural Development.

Training seminars for communal administrators, if acceptable, will be crucial to the realization of these objectives.



## Chapter 4

### RECOMMENDATIONS

#### 4.1 Overview

The scope of the evaluation was such that only a small sample of communes could be visited. Problems of logistics and the lack of communication facilities further reduced the number of people associated with the project who could be contacted. It is felt, however, that the team observed an adequate sample to conclude that in general the spring captation component of the project is an effective and well organized program. The program is effectively reaching its objective of providing clean water to residents of rural areas throughout the country. Through the spring capping program, a reliable and not easily polluted source is constructed. Although problems can still exist with improper drainage and infiltration of flood flows, the spring captations must be considered an improvement in terms of water quality and reliability over former water sources. The team found no evidence associating the spring program with increased consumption of water.

The team found the project well organized and found the objective of capping 4,300 spring over the life of the project achievable with the existing organizational structure. The team finds that the organizational structure can be utilized to further the impact of the project by providing hygiene and sanitation education to spring users and by encouraging proper maintenance of the improved springs. The short-term AID assistance being considered should be primarily directed towards meeting the objective of capping 4,300 springs and promoting associated hygiene, sanitation and maintenance efforts.

In contrast to the spring component, the dispensary water component is at an early stage of organization. The second expert has not yet been hired, but several foremen have been trained and administrative arrangements for maintenance have been finalized. The decision to institutionalize the component within the Department of Rural Water and Electricity has not been made. Addressing the needs of the Department thus will require a long effort and is beyond the scope of the relatively short-term assistance presently contemplated by AID. The alternative of concentrating assistance on building the UNICEF dispensary water supply program is not attractive without the institutionalization effort. Assistance without this effort would also involve a disproportionate allocation of funds for an additional expert to manage the component. Thus, of the three alternative approaches to AID financing, only one would likely fit AID's short-term criteria.

To summarize, the first and recommended approach is to concentrate on the existing spring captation program with increased

emphasis on training, maintenance, and hygiene and sanitation education. The second is to concentrate on institutionalization of the dispensary water supply program within the Department of Rural Water and Electricity. However, this option is not recommended because of the long term and heavy financial nature of such assistance. The third alternative is to concentrate on the dispensary water supply component. This alternative is not recommended either because of the need for additional technical assistance in this area. If the project were to fund an additional expert from another source, there would be no objection to contributing AID funds for commodities.

#### 4.2 Technical

The recommendations that follow outline the supplementary technical skills, simple technologies and complementary interventions which should be developed through the training and technical assistance proposed in the budget. These points should provide justifications in addition to the training and institutional needs.

1. Rehabilitation of the FBI springs will require the fontainiers to evaluate, troubleshoot, and repair the sites, emphasizing the need for a standard plan. These springs must be completely recapped in most cases. Massar has identified the need to retrain the corps in the possible reuse for the retaining walls and laundry places of the reinforced concrete slabs that are still intact.
2. Maintenance of the capped springs and their environs must be sufficient to insure proper drainage, minimal runoff effects and effective use of the safe and clean water supply. Annual commune-wide anti-erosion campaigns by the entire population exist and should provide opportunity for spring maintenance.
3. Fontainiers should understand the significance of the watershed concept and sources of pollution in order to advise the population in siting latrines, animal pens, and other possible sources of pollution.
4. Aerial photographs of Burundi should be purchased for the project. Photocopies of the project sites will provide a valuable resource for gravity system planning. A file for the spring capping project should be developed. Locations should be sited on a regional map.
5. Alternative designs should be tested for practical value, user acceptance, possible added cost,

labor and materials. They include sites for laundry and bathing where slope permits; water collection at eye level to reduce the distance a filled container (some weighing as much as 40 kilograms) must be lifted, and possibly full body rinsing or showers and other conveniences.

6. Evaluation of costs, benefits, and system efficacy of rainwater collection to supplement dispensary and other supplies in drier areas should be performed. Assessment of experiments in the Ruyigi area might be useful where a Belgian Catholic Mission is already providing corrugated tin roofing for those houses which meet construction standards (including a latrine). Additional costs of gutters and spout might be furnished by the Belgians. Cisterns could be constructed locally. Individual ruغو ceramic collection containers might be developed by the fontainiers.
7. Designs developed by UNICEF, AIDR Rwanda, CARITAS, the Malawi Rural Water Project, and others should be evaluated to determine if modifications and alternatives for greater convenience are called for. Ruzizi and another commune with capped springs but different conditions could be used to evaluate success and weaknesses, if any, of current design.
8. Specific design points:
  - Spring discharge spout should be located at a height adequate to serve largest local water container rather than coming up to the fontainier's knee.
  - Rocks should be placed above the spring wall, covering the trench mound to prevent erosion. This arrangement was observed in one site.
  - Collection area should have a wider opening.

#### 4.3 Training

Training is perhaps the largest single increased input into the project recommended by the evaluation team. Yet, for the results that can be achieved from appropriately planned and executed training, it is no doubt the most cost effective of the recommendations as well. Training recommendations are directed at four groups of personnel:

1. Fontainiers
2. Animatrices sociales
3. Communal Administrators
4. The Project Director and his Associate

#### 4.3.1 Training of Fontainiers

Fontainiers need frequent periodic refresher training, some technical but more especially in methods and techniques of community mobilization.

##### Technical training

Emphasis should be on sharpening spring capping and masonry skills, but training should also include skills related to latrine inspection and construction, compost pit management, wastewater drainage and rain catchment techniques for both dispensaries and rugos. Not all these technical subjects need to be covered in a single session, of course. One session every six months would be desirable.

##### Training in community mobilization

Carefully supervised experiential training is needed, emphasizing techniques of:

- Entry into a population
- Identifying leaders and other influential people
- Ascertaining commitment to work and material gathering
- Explaining the health and other reasons for the effort
- Setting group objectives
- Joint planning of work schedules
- Allocation of responsibilities
- Evaluation progress in human terms

##### Suggested format and techniques for both

Experienced fontainiers should be queried as to the problems they have encountered and how they have met these problems, both technical and human. This information should be used in part to design the refresher course, instruction manuals and future courses for new fontainiers.

The general format for the course should be one of solving the problems brought forth by the fontainiers. The step-by-step problem solving sequence could then help to form the basis for a series of training manuals and field guides. They should be taught to use the same problem solving technique in training population groups.

Use should be made wherever possible of Assistant Sanitarians from the Ministry of Health to train fontainiers in sanitation methods.

Consideration should be given to the idea of providing a bicycle as an incentive to good quality work. Loaned to the fontainier at first, it could become his at the end of a year if he maintained it and his work was otherwise satisfactory.

#### 4.3.2 Training of Animatrices Sociales

In a discussion with the Directrice of Social Promotion, it was determined that if the Animatrices Sociales were to become involved in the project, they would require some supplemental training in water and sanitation-related behavioral matters and in specifically applicable health education techniques. One stipulation is that whatever training is provided should be short and nearby.

The use of Animatrices Sociales has been justified earlier on the basis that (1) they are women, therefore more capable of dealing with many female-centered problems and (2) they have already been assigned one day a week of animation work.

It is suggested that the selected animatrices be given three days of training in the use of health education techniques applicable to water and sanitation related behavior to be used in both a home visitation and a group setting. Specific matters should include:

- a. Focusing efforts on young women and girls
- b. Domestic use of water in personal hygiene and food hygiene
- c. Proper transport and storage of water
- d. Care of a latrine
- e. Care of infants and small children, i.e. defecation
- f. Food protection
- g. Compost pit maintenance
- h. Wastewater drainage

This training could be held jointly with fontainiers during the last three days of their four-week course. For instance if the fontainiers for Muyinga, Gitega and Ruyigi Provinces were all to be trained at Gitega, then the last three days might take place back in the home province, at which time the fontainiers could be joined by a group of animatrices.

Liberal use should be made of training manuals, problem solving techniques and group work. Emphasis should be placed on the use of a similar problem solving format with population groups. Some consideration might also be given to issuing bicycles to animatrices in the same manner as to fontainiers.

#### 4.3.3 Communal Administrators

Successful use has been made of management training seminars for rural administrators in other countries. Rondinelli and others stress the strengthening of local government as the key and almost forgotten element in rural development. Too often rural administrators are throttled by lack of management skills to deal with the multiple programs thrust upon them. Lack of transport to get to rural areas and lack of adequate staff, simple office supplies, and basic amenities for themselves and their families make the task even more difficult.

If water and sanitation programs are to be effectively managed across the 79 communes of Burundi, the evaluation team recommends at least two one or two day training seminars for communal administrators, where problem solving skills would again be stressed. Illustrative management problems could be drawn from the day to day experience of the administrators in overseeing spring capping, latrine promotion, and the distribution of materials. Other themes might include personnel management, logistics, community mobilization and coordination of multiple ministry, multiple agency inputs.

Effective use of training manuals and group discussion could be made. The seminars could be held in Bujumbura or in regional sites.

If seminars were not acceptable, reference manuals could be developed and distributed as a substitute to administrators.

#### 4.3.4. Project Director and Associate

Some project funds should be used to send the project director and his Associate to Malawi for exposure to the very successful community based gravity systems constructed and maintained there. It would be particularly useful from a technical point of view, but the Malawi example is also instructive regarding community participation and the problems of integrating sanitation and health education. Copies of the Malawi reports will be pouched from WASH to USAID for use by the project staff. In addition, the Mission will receive a water supply and sanitation reference collection which will provide a good technical resource for the project staff.

#### 4.4 Recommendations Regarding Community Mobilization

The community mobilization program of the project is basically in good health. The following recommendations are designed to enhance the effectiveness of the process with respect to spring capping, but also to spring maintenance and the promotion of sanitation. These recommendations include:

1. Giving additional training in community mobilization skills to fontainiers (see 4.1 above).
2. Promoting an elementary organization for the community response to mobilization efforts.

Unless some structure of permanence specific to spring maintenance and the promotion of sanitation is created, these tasks will simply not be performed. Fontainiers should be equipped with skills to recognize and use available talent and the authority to assign individuals and groups the responsibilities for spring maintenance, spring surveillance, reporting needed repair, and surveillance of latrine maintenance, wastewater drainage and other sanitation matters. The creation of these basic structures will be a slow and difficult task but appears to the evaluation team to be crucial.

3. Use of animatrices sociales to help with mobilization and education of the population, particularly women (see section 4.2).
4. Experimental use of competition among sous-collines based on the quality of the spring and its maintenance.

As a further incentive to collaborative work on the springs and related problems, annual competition could be set up among sous-collines in a commune. Competent outsiders could be used as judges. Prizes could be given for the best constructed and the best maintained springs.

#### 4.5 A Survey of Water and Sanitation-related Behavior, Attitudes, Beliefs

Because the team was unable to uncover any systematic study and because information of this kind is essential to the training of personnel in hygiene education, the team recommends that a limited survey be undertaken in two areas of the country: one dry with a low population density and another with heavier rainfall and a high population density.

A sample of 150 households in each area would be adequate. Questions and observations would cover the range of behavior, beliefs, and attitudes relevant to achieving the health benefits of improved water supply and sanitation. These questions have been discussed in earlier sections.

The survey could be designed by a WASH consultant, thus saving project funds but could be carried out by animatrices sociales who have been trained in interview techniques.

This survey should be carried out as early as possible so that the information could be used in training to determine educa-

tional approaches. It might also serve as a baseline for future evaluation.

#### 4.6 Use of the Cooperative Mechanism

Wherever well established cooperatives exist (see section 2.4.2) arrangements should be made for the cooperative to provide labor, materials, perhaps the salary and supervision of the fontainier, and if feasible, the purchase and continued supply of cement, PVC pipe, galvanized steel pipe and plastic sheets. Discussions should be entered into with FECOBU and with the cooperative department of the Ministry of Rural Development to determine to what degree and where such arrangements could be undertaken.

#### 4.7 Further Roles for WASH

WASH should be considered as a supplementary resource for the implementation of the project, thus as a means of conserving project resources for direct in-country costs. Specific roles for WASH appear in four areas:

- 1) Training of animatrices sociales
- 2) Training of fontainiers
- 3) Training of communal administrators
- 4) Survey management

##### 4.7.1 Training Animatrices Sociales

Use of a WASH consultant would involve the design of the training and manuals, the training of trainers and the oversight of the first session in cooperation with project direction and the Ministry of Social Affairs. The same consultant, a social scientist with experience in application of social science techniques to health education, could be the one to oversee the survey of behavior, attitudes, and beliefs. This person must be a woman.

##### 4.7.2 Training of Fontainiers

A WASH sanitation specialist could be brought in to help the Ministry of Health sanitarians design and and initiate the implementation of this section of the course and manual not only for fontainiers, but also for the social animatrices and communal administrators.

A second longer-term (three to four months) roof and gutter rehabilitation and cistern construction specialist provided by WASH could be brought in if such a program gets underway in dispensaries where gravity schemes are not suitable.



#### 4.7.3 Training Communal Administrators

The principal WASH consultant here should be a management training expert in water supply and sanitation. This consultant should design the course manuals and oversee the first session in cooperation with project direction.

#### 4.7.4 Survey Management

The same female social scientist mentioned earlier should design the survey and instruments, train interviewers, pretest instruments, supervise field operations, control data transmission and management, oversee data analysis and prepare data for presentation to project direction and others.

APPENDIX A

Water and Sanitation for Health Project (WASH)  
Order of Technical Direction (OTD) No. 36

TO: : Mr. James Arbuthnot, P.E. April 6, 1981  
WASH Contract Project Director

FROM: Mr. Victor W.R. Wehman, Jr., P.E., R.S. *VWW*  
AID WASH Project Manager

SUBJECT: Provision of Technical Assistance Under WASH Project Scope of Work  
for USAID/Burundi (Bujumbura)

REFS: A) Bujumbura 0820, 23 March 81

1. WASH contractor requested to provide technical assistance to USAID/Burundi as per Ref. A, para. 2.C. and 3.A-E.
2. Suggest mission be cabled to change para. 4 to include one person having attributes of 4.A and B plus an internationally experienced rural water supply and sanitation socio-cultural anthropologist. Suggest Elmendorf or Sebastian if available
3. WASH contractor/subcontractor/consultants authorized to expend up to 75 days (35 days in the field for two persons including report generation) effort over a three month period to accomplish this technical assistance effort.
4. Contractor to coordinate with AFR/DR/HN (Dr. Sheppherd), AFR/DR/ENGR (Mr. Tumarello), AFR/DR, Desk Officer, and field mission to assure information exchange.
5. Contractor authorized to provide two (2) international round trips from consultant's home base to Burundi. Consultants should be brought back for debriefing if at all possible.
6. Up to 72 international and domestic days of per diem is authorized. Miscellaneous expenses are authorized.
7. Contractor authorized to obtain French interpreter, secretarial services in Burundi to support team if necessary. These services are in addition to the level of effort specified in para. 3 and 6 above.
8. Contractor authorized to provide for car rental if necessary to facilitate effort. Please note Ref. A, para. 4.C. on this aspect and determine if they have logistical support vehicles to carry out para. 3.B. in Ref. A.
9. Contractor will take portable typewriter (manual) for consultant's use.

10. Report should be written in English and translated to French in the field. An English version should accompany consultants back to Washington for debriefing purposes. Within 30 days of return to U.S., final report in English and French should be turned over to Burundi Desk Officer in AID/W.
11. Mission should be contacted immediately and technical assistance initiated as soon as convenient to mission.
12. Appreciate your prompt attention to this matter. Good luck.

(RUND)

UNCLASSIFIED  
Department of State

INCOMING  
TELEGRAM

PAGE 01 BUJUMB 0620 231437Z 7413 020477 AID0335  
ACTION AID-35

BUJUMB 0620 231437Z 7413 020477 AID0335

PUBLIC HEALTH TO DEVELOP COOPERATIVE EFFORTS IN RURAL WATER DEVELOPMENT AND COMMUNITY HEALTH/SANITATION EDUCATION.

ACTION OFFICE AFOR-06  
INFO AAAP-01 AFEA-03 AFCA-03 PPCE-01 POPR-01 PFPB-03 PPEA-01  
STA-10 A40S-01 DSHE-01 ENGR-02 CHG-01 AFDA-01 RELO-01  
MAST-01 /037 A4 823

INFO OCT-01 /035 W  
-----101276 231437Z /J4

R 231445Z MAR 81  
FM AMEMBASSY BUJUMBURA  
TO SECSTATE WASHDC 1394  
AMEMBASSY NAIROBI

UNCLAS BUJUMBURA 0620

AIDAC

FOR: AID/W FOR AFR/DR AND DS/HEA/EH  
NAIROBI FOR REDSO/EA

E.O. 12065: N/A  
SUBJ: REQUEST FOR WATER AND SANITATION FOR HEALTH PROJECT (WASH) SERVICES

1. SUMMARY: AAO REQUESTS WASH ASSISTANCE TO HELP EVALUATE IMPACT OF ON-GOING UNICEF/B'S RURAL WATER SUPPLY AND SANITATION PROJECT, IDENTIFY OTHER METHODOLOGIES TO INCREASE RURAL POPULATION'S ACCESSIBILITY TO SAFE WATER AND COMMUNITY HEALTH/SANITATION EDUCATION SERVICES, AND MAKE RECOMMENDATION TO AAO REGARDING POSSIBLE FUTURE AID ASSISTANCE TO RURAL WATER PROJECTS. END SUMMARY.

2. PROBLEM:

A. BURUNDI IS CLASSIFIED BY THE U.N. AS ONE OF THE 38 QUOTE RELATIVELY LEAST-DEVELOPED COUNTRIES UNQUOTE. WITH A YEARLY AVERAGE RAINFALL OF 600 TO 1500 MM, MUCH OF BURUNDI IS WELL PROVIDED WITH WATER. LITTLE INVESTMENT HAS BEEN MADE, HOWEVER, IN THE RURAL WATER SECTOR AND ANY ATTEMPTS AT RURAL WATER SUPPLY DEVELOPMENT MUST CONSIDER THE LIMITED FINANCIAL RESOURCES AND LIMITED MAINTENANCE CAPABILITY IN RURAL AREAS.

B. ONE APPARENTLY SUCCESSFUL EFFORT TO IMPROVE RURAL WATER SUPPLIES AND SANITATION IS THE UNICEF RURAL WATER SUPPLY AND SANITATION PROJECT. THIS PROJECT ATTEMPTS TO PROVIDE (1) CLEAN WATER FROM SPRING SOURCES THROUGH GRAVITY DISTRIBUTION TO RURAL HEALTH CENTERS, DISPENSARIES AND CENTERS OF SOCIAL ACTIVITIES AND (2) SPRING CAPTATIONS FOR SMALL COMMUNITIES IN APPROPRIATE REGIONS OF THE COUNTRY. THE PROJECT'S OBJECTIVES ARE TO PROVIDE 350 KMS OF GRAVITY FED SYSTEMS AND TO IMPROVE 4,300 SPRINGS. MOST PROGRESS HAS BEEN MADE TO DATE IN THE SPRING CAPTATION PROGRAM WITH THE PROJECT OPERATING IN OVER HALF OF THE 78 COMMUNES OF THE COUNTRY THROUGH A NETWORK OF TRAINED COMMUNITY WORKERS AND A SUBSTANTIAL SELF HELP CONTRIBUTION.

C. THE UNICEF ACTIVITY IS RUNNING OUT OF FUNDS. AAO IS CONSIDERING WHETHER AID MAY WISH TO SUPPLEMENT OR FOLLOW-ON FROM THE CURRENT UNICEF EFFORT. THIS TYPE OF ASSISTANCE IS SUBSTANTIATED BY HEALTH SECTOR STUDY. THE SPECIFIC PROBLEM FOR WHICH AAO DESIRES WASH ASSISTANCE IS TO HELP EVALUATE THE IMPACT OF THE WATER SYSTEMS WHICH HAVE BEEN PROVIDED. BECAUSE NO EVALUATION ACTIVITY WAS BUILT INTO THE UNICEF'S PROJECT. USING WASH ASSISTANCE, AAO ALSO SEEMS TO IDENTIFY OTHER OPPORTUNITIES AND METHODOLOGIES TO INCREASE THE RURAL POPULATION'S ACCESSIBILITY TO SAFE WATER AND TO INCREASE THE CAPABILITY OF THE MINISTRIES OF RURAL DEVELOPMENT AND

3. SCOPE OF SERVICES REQUIRED:

A. DEVELOP EVALUATION CRITERIA FOR THE SPRING CAPTATION COMPONENT OF THE UNICEF RURAL WATER PROJECT;  
B. CONDUCT A BRIEF EVALUATION OF THE PROJECT BY VISITING A REPRESENTATIVE CROSS SECTION OF THE COMMUNES WHERE THE PROJECT HAS BEEN ACTIVE, IDENTIFY BENEFICIARIES AND ANY IMPACTS OF THE PROJECT AND ATTEMPT TO IDENTIFY AREAS WHERE THE PROJECT SHOULD PLACE GREATER EMPHASIS;

C. REVIEW ACTIVITIES OF OTHER AGENCIES AND DONORS IN THE BURUNDI RURAL WATER SECTOR AND MAKE RECOMMENDATIONS AS TO IMPROVED ORGANIZATION OF LOCAL PARTICIPATION IN RURAL WATER ACTIVITIES;

D. REVIEW EXISTING DESIGNS OF UNICEF AND OTHER DONOR GRAVITY FED WATER PROJECTS IN VIEW OF OBTAINING MOST COST EFFECTIVE SYSTEMS;

E. MAKE RECOMMENDATIONS TO AID REGARDING FUTURE AID ASSISTANCE PROJECT. FACTORS TO BE CONSIDERED SHOULD INCLUDE THE EXPERIENCE OF OTHER DONORS, DEGREE OF INTEREST AND EXPECTED PARTICIPATION BY POTENTIAL BENEFICIARIES AND GOV OFFICIALS AND POSSIBLE HEALTH AND OTHER IMPACTS OF SUCH A PROGRAM.

4. SUGGESTED TEAM COMPOSITION:

I. RURAL WATER SPECIALIST- SENIOR PERSON HAVING BROAD EXPERIENCE IN RURAL WATER PROGRAMS IN DEVELOPING COUNTRIES. PREFER CANDIDATE WITH TECHNICAL BACKGROUND WHO CAN ALSO ADDRESS ORGANIZATIONAL ASPECTS OF THE ASSESSMENT;

B. HEALTH/SANITATION SPECIALIST - PREFERABLY A PERSON HAVING MPH AND EXPERIENCE WORKING WITH HEALTH EDUCATION PROGRAMS RELATED TO WATER-BORNE DISEASES AND ENVIRONMENTAL SANITATION;

C. TEAM WILL ALSO CONSIST OF REDSO/EA WATER RESOURCE ENGINEER WHO WILL HAVE MAJOR RESPONSIBILITY FOR ENGINEERING ASPECTS. TEAM WILL BE SUPPORTED BY AAO AND UNICEF;

D. LANGUAGE REQUIREMENTS- FRENCH 5-3;

E. SUGGEST THREE TO FOUR WEEKS DURATION OF SERVICES WITH DRAFT REPORT COMPLETED PRIOR TO DEPARTURE;

F. PLEASE ADVISE WITH INFO NAIROBI TIMING AND BIO-DATA OF TEAM MEMBERS FOR MISSION CONCURRENCE.

5. FOR NAIROBI: REQUEST AVAILABILITY W. BLANK FOR SUBJECT ACTIVITY.  
COOK

*WASH/EA/WASH*  
*Received DS/HEA (Webman)*  
*0943 21 Mar*  
*Passed to WASH 21 MAR 81*

WASH/EA

## APPENDIX B

### Sites Observed

The sites visited on field trips were only those previously scheduled for Massar's normal work week. It was especially beneficial for the evaluation team to observe and participate in typical project tasks under various conditions with the UNICEF project staff.

July 10: Kiganda Commune, Muramvya province: Evaluation team with Claude Massar, project social animatrice and accountant

Visited communal administrative post, then visited three spring sites, one household (rugo) latrine in the company of the fontainier and the First Communal Secretary of the Party UPRONA. Spent an hour at one spring site in group discussion, with above persons plus the administrator of the sub-colline (Nyumbakumi), and several users of the spring (men and women), regarding how the spring was capped, how the request was made and the work organized, and additional facilities they desired. Questions related to sanitation practices, and water use were also discussed.

July 14-16: Gisuru, Nyabitare Commune, Ruyigi Province: Evaluation team, Claude Massar and project social animatrice.

Met with the communal administrator, the fontainiers, sisters of Notre Dame d'Afrique, staff of the dispensary at Murehe, Mr. and Mrs. Hoffman of the World Gospel Mission at Murehe, and Father Desmet of the Belgian Cooperative Housing Project. Held a very fruitful meeting with communal administrator on problems related to fontainier performance, local supplies and their transport, UNICEF supplies, and in general his local management of the project. A top priority item was the seeming impossibility of serving the Murehe dispensary with water. Recommended moving dispensary to Gisuru. Lodging was provided by the sisters. From this base of operations we visited five separate spring sites covering a range of types: old Fonds du Bien-Etre Indigene (FBI) springs, a pumping station, two spring cappings in progress, the source and captation of the local gravity scheme and many public and private latrines.

Rather extensive discussion held with users (mainly women) on quantity, use patterns, and preferences.

July 19:

Mbuye Commune, Muramvya Province: Evaluation team, Claude Massar, Yabukemi Salvator, topographer from Ministry of Public Works.

Visited the communal administrator and in his company the dispensary, health center, social center, and schools. Estimated water needs of all these centers plus the parish, market, and local population.

Visited several public latrines in poor condition and discussed problems of decreased flow in existing gravity scheme. All then visited three spring sites proposed for new gravity scheme, two of which had been excellently capped by the local project fontainier.

Discussed optional systems and decided to leave question open until source of existing system could be visited.

## APPENDIX C

### Officials Visited

- July 7: Vicky Kunkle, USAID Action Officer  
Abbe Fessenden, USAID Program Officer  
Terry Lambacher, AID Affairs Officer  
Ntunguka Samson, USAID Program Assistant  
Brigitte Trimmer-Smith, UNICEF Resident Representative
- July 8: Claude Massar, UNICEF Project Director  
Yabukemi Salvator, UNICEF Project Counterpart
- July 9: Marc De Smet, Societe Mixte d'Etudes au Burundi  
Alain Pliez, Association Internationale du Developpement Rural
- July 13: Emile Andriaesen, Belgian Technical Assistance  
Robert DeVaevre, Belgian Technical Assistance, Ministry of Rural Development Department of Rural Hydraulics
- July 17: Bitangumutwenzi Adrien, Ministry of Rural Development, Director General  
Sister Jeanne Chanel, CARITAS  
Bernard Storme, MD, Ministry of Health, Medical Inspector, Hygiene Service  
Nshanaje Marguerite, Ministry of Social Affairs, Directrice of Social Promotion
- July 19: Edmond Ribaira, MD, Malagasy Republic, MOH/Public and Social Hygiene Director, UNICEF Consultant

Additional persons destined for interview but not contacted:

Hakiza Augustin, Ministry of Rural Development Department of Rural Hydraulics and Electricity, Director

Kabasha Lubweka, WHO Sanitary Engineer with Ministry of Health, Department of Hygiene and Sanitation

## APPENDIX D

### Documents Reviewed

- Association for International Rural Development (AIDR), "Map of Installed Distribution System, in Burundi," 1978.
- Blank, Herb, USAID/Nairobi Trip Report on Rwanda Water Sector, February 1981, 14pp.
- Chanel, Sister Jeanne, and Sister Suzanne Ferland, "Activity Reports, Maternity Customs, Animation Conference" (in French), 1979-1981.
- Cortvriend, Dirk, "Pilot Program for High Intensity Manual Labor Public Works Projects in Muramvya Province" (in French) (Several Progress Reports obtained from ILO Office in GRB/ Ministry of Agriculture), 1979-81.
- Gerard, J., Belgian Technical Assistant, "Water Distribution Systems in Burundi" (in French), April 1975, 60pp.
- I.L.O., GRB/MDR, "The Administrative Board of a Cooperative," October, 1980, 10pp.
- Kennedy, John, Dr., et al., DIMPEX Association for USAID, "Burundi Health Sector Assessment and Strategy," April 1981, 209pp + Annex.
- Kunkle, Vicky, USAID, "1980 Other Donor Report - Burundi," February 1981, 21pp.
- Marcenier, P. Dr., et al., "Report of Working Group on the Sanitation Program" (in French), Bujumbura, April 21 - September 3, 1978, 58pp.
- Massar, Claude, "Actions of Bilateral and Multilateral Donors in the Burundi Water Sector" (in French), April 1981, 5pp.
- \_\_\_\_\_, A Two Part Report: "Water for Dispensaries and Communes in Rural Burundi - Gravity Systems and Spring Capping" (in French), August 1977, 57pp.
- \_\_\_\_\_, "Water Supply for Dispensaries and Health Centers and the Management of Springs" (in French), 1980, 3pp.
- \_\_\_\_\_, "Spring Catchment and Water Supply for Rural Dispensaries in Burundi" (English), June 1980, 8pp.
- Palace for Arts and Culture, The Rugo in the Burundian Tradition (in French), May 1977, 11pp.



Republic of Burundi, Five Year Plan for Economic and Social Development 1978-82, with Sector Annexes, 212pp.

Storme, Bernard, M.D., et al., "Cholera Epidemic in Burundi, 1978" (in French), Ann. Soc. Belge, Med. Trop., 1979, 59, 413-425.

TAICH Country Report, "Development Assistance Programs of U.S. Non-Profit Organizations, Burundi," September 1979, 15pp.

USAID, Burundi Country Development Strategy Statement (FY83), January 1981, 66pp.

USAID, "Social Soundness Analyzing Annex" from Agriculture Project Paper, Burundi, 1980, 19pp.

WHO, "Rapid Sector Assessment of Water Supply and Sanitation," (in French), October, 1978, 15pp.

APPENDIX E

LETA Y'UBURUNDI - UNICEF

REPUBLIQUE DU BURUNDI - UNICEF

Projeje yubaka amasoko y'amazi mu gihugu

Projet d'Aménagement des Sources et Alimentation en Eau

des Dispensaires Ruraux. B.P. 942 Bujumbura.

Izina ry'umukozi :

Raporo y'ukwezi kwa :

Nom du fontainier :

Rapport du mois de :

Provinsi :

Komine :

Province :

Commune :

Umusozi :

Colline :

-Igitigiri c'amasoko yaheze kubakwa n'isima muruko kwezi

Nombre de sources terminées au courant du mois

N.B. Ntimwibagire gusaba ibikoresho vy'ukwezi kuza:

N'oubliez pas de remplir la fiche de demande de matériel pour le  
mois prochain.

Visa: Administrateur Communal

Signature du fontainier:

LETA Y'UBURUNDI

REPUBLIQUE DU BURUNDI.

Projeje yubaka amasoko y'amazi mu gihugu

Projet d'Aménagement des Sources et Alimentation en Eau

des Dispensaires Ruraux. B.P. 942 Bujumbura.

Izina ry'umukozi :

Raporo y'ukwezi kwa :

Nom du fontainier :

Rapport du mois de :

Umusozi:

Colline:

-Igitigiri c'amasoko yaheze kubakwa n'isima muruko kwezi

Nombre de sources terminées au courant du mois

N.B. Ntimwibagir gusaba ibikoresho vy'ukwezi kuza:

N'oubliez pas de remplir la fiche de demande de matériel pour le  
mois prochain.

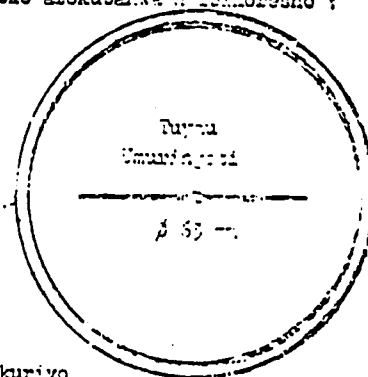
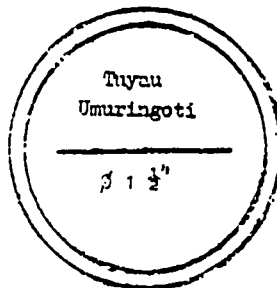
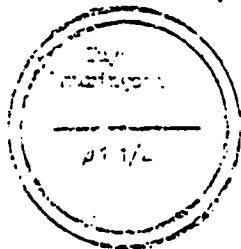
Visa: Administrateur communal

Signature du fontainier:

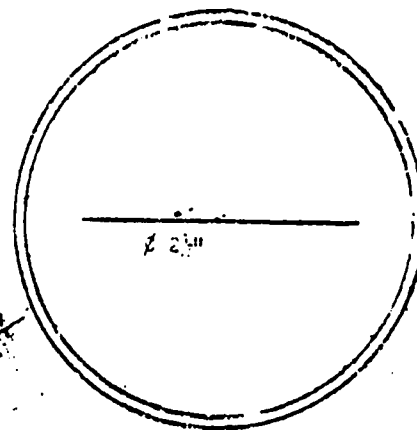
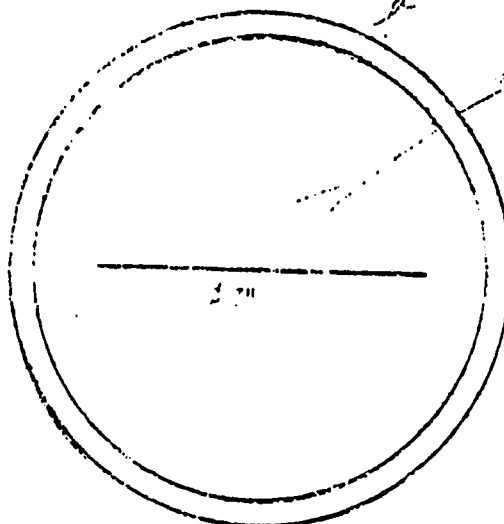
Centre National de Recherches de Alimentation en Eau des Dispensaires Ruraux  
 Centre de Recherche Masoko ya Misengo mu gihugu hagati  
 B.P. 949 BUJUMBURA

FORMULA NA BANYAMA BY'IBYIKORISHA - IFISHI YO GUSABA IBYIKORISHO

Nom du fontainier : Nombre de Sources qui seront réalisées avec ce mat.  
 Feina y'ubwaguke : Igitigiri c'amasoko azokubakwa n'ubwaguke :  
 Province :  
 Localité :



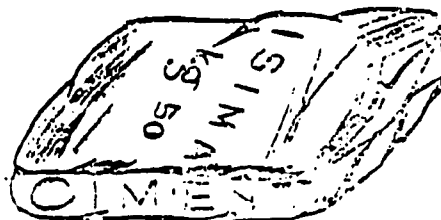
Ubwaguke bw'umiringoti buranditswe kuriyo



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 Igipanga cyakamwanya:

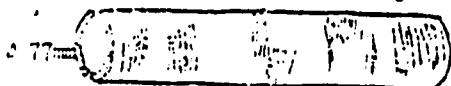


Ciment(s) : Sac(s) :  
 Isima : Umufuruko :



2. Banyama by'ibinyanga by'ubwaguke - Ibinyanga by'umiringoti y'ubwaguke.

3. Ukina nwa gikoresha mu muringoti w'ubwaguke bwa 63 mm



Signature :  
 Umufuruko :

Date :

4. Iki nwa gikoresha mu muringoti y'ubwaguke buranditswe na 1 1/4" na 1 1/2".

UNICEF - LETA Y'UBURUNDI

UNICEF - GOUVERNEMENT DU BURUNDI

Poroje yubaka amasoko ya rusengo mu gihugu hagati

Projet d'Aménagement des sources et Alimentation en eau des Dispensaires Ruraux.

Nom du fontainier :

Commune :

Isina ry'umukozzi :




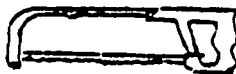

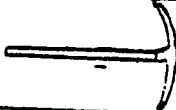
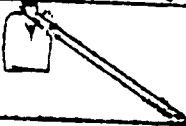


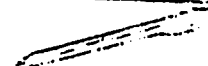
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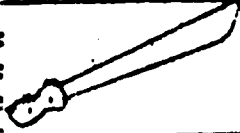


Province :

Provensi :

Equipement du fontainier

Ibikoresho vyo kubaka amasoko ya rusengo

OBJET	IBIKORESHO	DESSIN ISEUSHANYO	NOMBRE IGITIGIRI	DATE ITARIKI	SIGNATURE UMUKONO
Truelle	Umwiko				
Niveau	Inivo				
Mètre	Instero				
Scie à métaux + lame	Imusumano				
Pelle	Igipawa				
Pic	Icipiri				
Houe	Isuka				
Marteau	Inyundo				
Corde de					
					

OBJETS	IBIKORESHO	DESSIN ISHUSHANYO	NOMERE IGITIGIRI	DATE ITARIKI	SIGNATURE
Machette	Umupanga				
Bottes	Ibirato				
Barre à mine	Umutarimbo				

Signature du magasinier

Umukono w'uwashinzwe ivyo bikoresho

- Si le Fontainier cesse d'exercer ses fonctions, le matériel doit être remis à son successeur en présence d'un témoin.
- Iyo umukoni ahejeje akazi kanziranga, ivyo bikoresho akwiye kuroba abana umurubizi w'ive hariho n'icabona.

Pour la remise

Pour la reprise

Signature :

Nom :

Remarques:

Grade: