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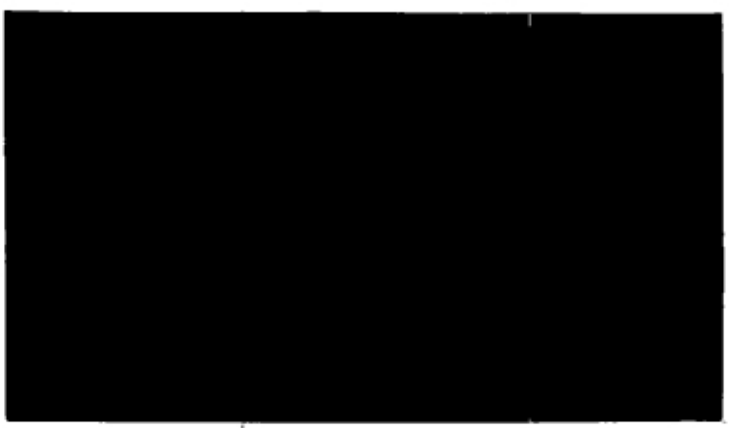

ENVIRONMENTAL HEALTH PROJECT

WASH Reprint: Field Report No. 328

Impacts and Lessons Learned from the Rural Water Borne Disease Control Project Swaziland

Jerry Van Sant
James Sonnemann
Rita Klees

April 1991

Prepared for the Rural Water Supply Board and the Ministry of Health, Government of Swaziland, and the USAID Mission to Swaziland under WASH Task No. 221

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WASH and EHP

With the launching of the United Nations International Drinking Water Supply and Sanitation Decade in 1979, the United States Agency for International Development (USAID) decided to augment and streamline its technical assistance capability in water and sanitation and, in 1980, funded the Water and Sanitation for Health Project (WASH). The funding mechanism was a multiyear, multimillion-dollar contract, secured through competitive bidding. The first WASH contract was awarded to a consortium of organizations headed by Camp Dresser & McKee International Inc. (CDM), an international consulting firm specializing in environmental engineering services. Through two other bid proceedings, CDM continued as the prime contractor through 1994.

Working under the direction of USAID's Bureau for Global Programs, Field Support and Research, Office of Health and Nutrition, the WASH Project provided technical assistance to USAID missions and bureaus, other U.S agencies (such as the Peace Corps), host governments, and nongovernmental organizations. WASH technical assistance was multidisciplinary, drawing on experts in environmental health, training, finance, epidemiology, anthropology, institutional development, engineering, community organization, environmental management, pollution control, and other specialties.

At the end of December 1994, the WASH Project closed its doors. Work formerly carried out by WASH is now subsumed within the broader Environmental Health Project (EHP), inaugurated in April 1994. The new project provides technical assistance to address a wide range of health problems brought about by environmental pollution and the negative effects of development. These are not restricted to the water-and-sanitation-related diseases of concern to WASH but include tropical diseases, respiratory diseases caused and aggravated by ambient and indoor air pollution, and a range of worsening health problems attributable to industrial and chemical wastes and pesticide residues.

WASH reports and publications continue to be available through the Environmental Health Project. Direct all requests to the Environmental Health Project, 1611 North Kent Street, Suite 300, Arlington, Virginia 22209-2111, U.S.A. Telephone (703) 247-8730. Facsimile (703) 243-9004 Internet EHP@ACCESS DIGEX.COM.

WASH Field Report No. 328

IMPACTS AND LESSONS LEARNED FROM THE RURAL WATER BORNE DISEASE CONTROL PROJECT, SWAZILAND:

A TEN-YEAR RETROSPECTIVE

Prepared for
the Rural Water Supply Board and
the Ministry of Health,
Government of Swaziland,
and the USAID Mission to Swaziland under
WASH Task No. 221

by

Jerry VanSant
James Sonnemann
Rita Klees

April 1991

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Related WASH Reports

Field Report No. 263. *Water Supply and Sanitation Planning in Swaziland*. Prepared by Lee Jennings and Robert Gearheart. March 1989.

Field Report No. 238. *Human Resources Development in the Swaziland Water Supply Sector*. Prepared by John E. S. Lawrence and Prescott A. Stevens. June 1988.

Field Report No. 219. *Swaziland Health Education Consultancy*. Prepared by Lynn H. Gibert. February 1988.

Field Report No. 176. *Community Participation Workshop—Mbabane, Swaziland*. Prepared by Jacques M. Faigenblum and Michael J. Lythcott. July 1986. Also available in French.

Field Report No. 120. *Swaziland Rural Waterborne Disease Control Project: A Mid-Term Evaluation*. Prepared by Jacques M. Faigenblum, A. Dennis Long, and DeWolfe Miller. March 1984.

Field Report No. 108. *Strengthening the Management of the Public Health Inspectorate of Swaziland*. Prepared by Harry Phillips and Eva Salber. December 1983.

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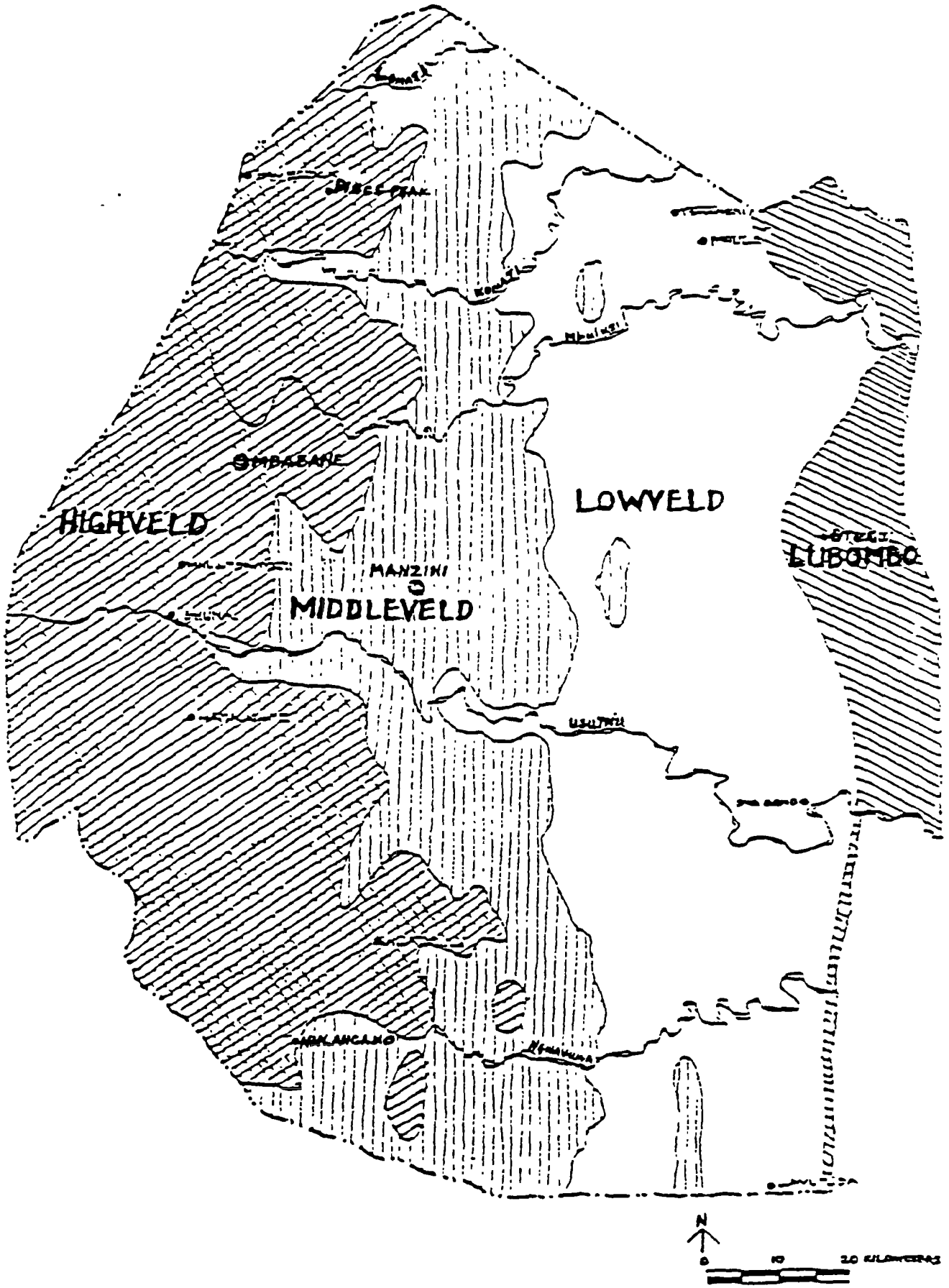
Acronyms

AID	Agency for International Development
BCU	Bilharzia Control Unit
CDO	Community Development Officer
CCCD	Combatting Childhood Communicable Diseases
GOS	Government of Swaziland
HA	Health Assistant
HEU	Health Education Unit
HI	Health Inspector(ate)
KAP	Knowledge, attitudes, practices (survey)
MNRLUE	Ministry of Natural Resources, Land Utilization, and Energy
MOH	Ministry of Health
NAG	National Action Group
NGO	Nongovernmental Organization
O&M	Operations and Maintenance
ORT	Oral rehydration therapy
PHC	Primary Health Care (Project)
PHE	Public Health Engineer
PHEA	Public Health Engineering Adviser
PHEU	Public Health Engineering Unit (RWSB)
PP	1979 Project Paper

RHM	Rural Health Motivator
RWSB	Rural Water Supply Board
RWBDCP	Rural Water Borne Disease Control Project
TA	Technical Assistance
TSG	Technical Sub-group (of the NAG)
USAID	U.S. Agency for International Development (mission)
VIP	Ventilated improved pit (latrine)
WASH	Water and Sanitation for Health Project
WHO	World Health Organization

MAJOR ECOLOGICAL ZONES OF SWAZILAND



About the Authors

Jerry VanSant is Director for the Center for International Development, Research Triangle Institute, N.C. Working in the field of international development since 1975, Mr. VanSant has specialized in areas related to management information systems, project design, project management, and institutional development, including training needs assessment. He has participated in several A.I.D. project evaluations over the past decade.

James Sonnemann began his work in Africa as a Peace Corps Volunteer in Niger in the late 1960s. After completing medical and public health degrees, he returned to Africa in 1976 and has worked there since in a variety of capacities. In addition to Peace Corps and short-term assignments, his experiences include health planning in Togo, building epidemiologic capacity and revamping the health information system in The Gambia, and managing broad-ranging USAID-sponsored primary health care projects in Sudan and Cameroon.

Rita C. Klees works with the office of Health, Bureau for Science and Technology as a AAAS Fellow (American Association for the Advancement of Science); she is the recipient of a Science and Diplomacy Fellowship. She served on the Swaziland evaluation team as the public health engineer and community development specialist. She holds an M.S. and Ph.D. in environmental engineering. She also has a master's degree in social work, with 15 years experience in community mental health and education.

EXECUTIVE SUMMARY

Introduction

The purpose of this evaluation was to determine the impact of the 1979-89 Swaziland Rural Water Borne Disease Control Project (RWBDCP). The evaluation was conducted in November-December 1990 by a three-person team provided by the AID centrally funded WASH Project. The evaluation scope of work, prepared by USAID/Swaziland, emphasized project impacts on sustainable institutional development, water and sanitation improvements, and lessons learned from the 10 years of project experience. Typically, USAID impact evaluations attempt to measure the degree and direction of goal level changes resulting from project assistance. Ideally, objectively gathered and scientifically evaluated data are used to measure project impacts particularly in the areas of health, and social and behavioral changes. However, in this evaluation, due to the absence of such data for the RWBDCP, the team found it necessary to broaden the definition of "impact" to include the achievement of project goals and purposes as well as project inputs and outputs. The team obtained information in Swaziland from the extensive archive of project documentation, field visits throughout the country, and interviews with key government and USAID officials as well as field workers and beneficiaries.

The RWBDCP began in 1980 with a focus on alleviation of water-borne disease, especially schistosomiasis. Diarrheal disease control also emerged to a high priority early in the project. In time, however, and particularly in the last four years of the project, priority attention was directed toward the provision of piped water and associated sanitation improvements to rural communities.

Project Impacts

Institutional Impact

Training, technical support, and technical assistance all enabled involved Government of Swaziland (GOS) agencies (the Rural Water Supply Board and the Health Inspectorate and Health Education units of the Ministry of Health) to perform more effectively, at least operationally, during the life of the project. The Rural Water Supply Board (RWSB) became very productive in the construction of water systems. The Bilharzia Control Unit was reinforced, and the Health Education Unit gained a stronger place within the MOH, thanks largely to the early years of the project. These operational improvements appear sustainable.

The project had less impact on broader institutional capabilities, coordination, and sector development in the Swazi agencies involved with the RWBDCP. The development of a public health perspective within the RWSB has not been sustained. The long-term public

health engineer achieved a personal coordinating role that has been conspicuously lacking since his departure. Although the project helped to establish a strong institutional base for water supply and sanitation sectoral planning, the level of continuing interagency coordination at the center is tenuous and the sectoral planning process has not been sustained By contrast, at the field level, informal coordination between MOH and RWSB personnel remains strong and generally effective. in large part as a result of the emphasis on the linkage of water and sanitation fostered by the project.

The absence of functioning information systems or any apparent demand for their use severely constrains the ability of the RWSB and the MOH to monitor their activities and therefore to plan effectively. Project assistance in this area was a conspicuous failure.

Several RWBDCP initiatives such as health communication and community development paved the way for continuing effective GOS-USAID collaboration under other project umbrellas

Health and Environmental Impact

RWBDCP was designed to decrease morbidity and mortality in rural Swaziland by reducing water-related diseases Of particular concern were schistosomiasis and the diarrheas. Reducing their transmission was expected to follow if people used latrines, avoided contact with contaminated water, and had more water readily available for hand washing and personal hygiene.

The project ultimately provided plentiful potable water for domestic use to an estimated 52,000 rural Swazis in 52 communities through some 529 water taps This is the single most visible impact of the project Available data were inadequate to document decreases in diarrhea and schistosomiasis in the project communities The 1988 Swaziland Family Health Survey did, however, indicate that rural families with access to piped water systems have lower diarrhea rates than those without, leading us to believe that a real impact on health has occurred. Moreover, health sector personnel have observed a definite decrease in childhood diarrhea.

On the sanitation side, at least 1,400 ventilated improved pit latrines, and probably many more, were constructed with project support Their health impact, however, has not been demonstrated.

A baseline knowledge, attitudes, and practices (KAP) survey was completed by the project in 1982. Had it been repeated, it probably would have confirmed that health-related behavior has improved in rural Swaziland. Health messages are widely disseminated; people generally appreciate the importance of clean water, especially for drinking When prevailed

upon to build latrines, they come to like them and to use them. There is little to suggest, however, that people attempt to prevent schistosomiasis by avoiding contaminated water.

Community Impact

During the RWBDCP, a shift occurred from centralized construction of water systems with no local involvement to the current emphasis on community organization, training, and financial commitment. This shift was based on RWSB experience indicating that systems generally failed not because of technical problems but because communities lacked the organizational, financial, and technical capacity to solve their own system problems. As a result, the RWSB and Health Inspectorate, with project support, developed procedures which involved communities in their rural water supply and sanitation system—planning, design, construction, operation, and maintenance. The project design specifically identified women as primary beneficiaries and, in fact, women did play a key role in community organization.

The impact of community participation on the sustainability of water supply and sanitation projects in Swaziland has yet to be fully demonstrated because the systems constructed under this model are too new to have experienced significant operational problems. Communities with RWBDCP water and sanitation systems, however, do have adequate funds, trained community members, and an organizational structure in place that is sufficient to handle predictable maintenance problems.

Under RWBDCP, the RWSB demonstrated the feasibility of the community participation approach to water and sanitation system construction and maintenance. The RWSB has applied this approach to water and sanitation systems now funded by other donors.

Lessons Learned

From this analysis of project impacts, several lessons emerge that may be of value to readers of this evaluation. Because RWBDCP has ended, these lessons are directed to planners and implementors of other projects, both in Swaziland and elsewhere.

1. Appropriate community-based water and sanitation improvements, when combined with supportive public health education and services, have the potential to bring benefits to a significant number of people at relatively low cost.

2. Community organization pays off, particularly when money and effort must be invested. Sustainable water and sanitation services depend on consumer demand as reflected in willingness to make a commitment of time and financial resources.

3. Community motivation to build latrines is increased when latrine construction is a prerequisite for the start-up of water supply systems.

4. Project designers should identify usable, management-oriented indicators to guide both project implementors and evaluators in measuring progress against objectives. Moreover, care should be taken to assure that indicators used before and after the project are comparable.

5. The priority of a long-term adviser in the final phase of his or her time in the field should be to establish local institutional mechanisms and capacity and to phase out direct implementation and coordination roles. When the role of a technical advisor is much broader than that of the counterpart who is expected to replace him or her, the chances of successful replacement and sustainability are diminished.

Chapter 1

INTRODUCTION

1.1 Background of the Evaluation

The purpose of this evaluation was to determine the impact of the Swaziland Rural Water Borne Disease Control Project (RWBDCP) in

- overall sectoral development of the water supply and sanitation sector in Swaziland;
- support to the public health engineering unit of the Rural Water Supply Board (RWSB);
- the construction and rehabilitation of rural water supply systems;
- the construction of latrines; and
- health education and community participation in areas provided with water supply systems under the project.

Typically, USAID impact evaluations attempt to measure the degree and direction of goal level changes resulting from project assistance. Ideally, objectively gathered and scientifically evaluated data are used to measure project impacts, particularly in the areas of health and social and behavioral changes However, in this evaluation, due to the absence of such data for the RWBDCP, the team found it necessary to broaden the definition of "impact" to include the achievement of project goals and purposes as well as project inputs and outputs.

RWBDCP evolved into a 10-year cooperative effort between the Government of Swaziland (GOS) and USAID that ended in September 1989 This evaluation, therefore, provides a retrospective look a full year after the end of USAID-supported project activities.

The focus of the evaluation is on overall project impact as well as on lessons to be learned from the varied activities of this project over its life. We believe these lessons can be useful for related water supply and sanitation sector planning and implementation by the GOS, USAID, and other development agencies

The project has been well-documented over its life. In addition to the usual USAID project materials, contractor reports, and evaluations, there is a lavish supply of reports from short-term consultants addressing a range of project-related issues (see Appendix B). These reports provide a rich inventory of descriptive and prescriptive content. By and large, however, they

offer relatively little information about project impact, especially on the welfare and behavior of rural beneficiaries.

To help complete the picture, this report minimizes detailed description available elsewhere and attempts to draw out broader impact information. In particular, we emphasize project impact on institutional development in the Swaziland water and sanitation sector, on indicators of local health and environmental sanitation, on communities receiving project services, and on Swazi beneficiaries themselves.

1.2 Members of the Team

A three-person team performed the evaluation with the generous assistance of GOS and USAID personnel. The team consisted of

> Jerry VanSant, team leader and sectoral planning/institutional development specialist. Mr. VanSant is the director of the Center for International Development at Research Triangle Institute, a member of the WASH project consortium.
>
> James Sonnemann, public health physician and health institution specialist. Dr. Sonnemann's services were provided by the AID-funded Vector-Borne Disease Control project.
>
> Rita Klees, environmental engineering and community development specialist. Dr. Klees is an American Association for the Advancement of Science Fellow seconded to the AID Office of Health.

The AID-funded Water and Sanitation for Health Project (WASH) provided major assistance to the funding, selection, and preparation of the evaluation team.

1.3 Scope of Work

The scope of work for this evaluation was provided by the USAID mission to Swaziland and focused the team's attention on the following elements:

- the effects and impacts, both positive and negative, produced by project activities, with particular attention to the sustainability of improvements resulting from the project;
- the project's contribution to the institutional setting in which sectoral development takes place in Swaziland;

- the success of AID-financed activities in the water and sanitation sector in Swaziland;

- the impact of planned and unplanned efforts of the project, particularly in the area of sectoral development;

- positive project achievements as well as design or implementation factors that impeded project success; and

- lessons learned from project implementation, including which strategies and mechanisms were most effective and why.

1.4 Evaluation Methodology

The evaluation was conducted in Swaziland between November 12 and December 3, 1990. In addition to its time in the field, the team benefitted from a two-day team-planning meeting in Washington facilitated by the WASH Project. That meeting provided the opportunity to define major evaluation issues, obtain project documents, and meet key informants then in Washington.

The team obtained information in Swaziland by reviewing a broad range of documents (see Appendix B), completing field visits at randomly selected sites in the four regions of Swaziland (see Appendix C), and interviewing central office, regional, and field staff from host country implementing agencies, USAID, and non-governmental organizations involved in the project. Information also was obtained from other donor agencies active in the water and sanitation sector, individuals in Swaziland with some past connection to the project and/or sector, and local community leaders and beneficiaries. Appendix A contains a list of persons interviewed for this evaluation.

To help organize and systematize its interview and site visit investigation protocol, the team developed a set of major agency interview and site investigation issues to use as a guide. These are listed in Appendix D.

The team held regular progress briefings with USAID staff during the evaluation. A draft report was provided to USAID and GOS officials several days before the end of the field work in order that comments and suggestions could be incorporated into the final report Revisions were completed prior to team departure from Swaziland on December 3.

1.5 Project Background and Context

Development of the RWBDC project was preceded by project identification research oriented toward the health impact of schistosomiasis in Swaziland and how the disease could be controlled. Actual project design in 1979, however, focused more broadly on water-borne disease reduction, and particularly on sanitation and behavior related to water-borne diseases. The project designers considered control of diarrheal diseases to have the potential to reduce the high infant mortality rate. Elevation of diarrheal disease control efforts to a high priority by the GOS was reinforced by a cholera outbreak in 1981-2. By 1986, when the original project was extended for a final three years, concentration focused almost exclusively on improvements in the rural water supply and sanitation sector.

Initially the project did not include the actual construction of water supply systems at all, in part because of the activity of other donors in this area and concerns about overtaxing the personnel of the Rural Water Supply Board [1] The initial emphases of the project, therefore, included improvement of rural sanitation through latrine construction, health education to reinforce the benefits of improved water supply and sanitation, and institutional support through training and technical assistance for personnel in key GOS agencies Major foci of the technical assistance were health education and public health engineering for water supply and water project design. Long-term TA also was devoted to the epidemiology of schistosomiasis (to guide project interventions) and social science research to guide health education activities. Renovation of the GOS Bilharzia laboratory and construction of a building for the Health Education Unit also remained as project components in the initial $4.6 million ($3.3 million USAID and $1.3 million GOS) design

Ultimately, the "immediate goal" of the initial project was stated as *improving the water use, water protection, and sanitation habits of the rural population*. This emphasis on the adoption by individuals of health-promoting behavior was linked to a project purpose to *expand the capacity of the GOS to deliver effective preventive health services to combat diseases related to water and poor sanitation*. The logic of the goal-purpose linkage was to correct a perceived institutional weakness in the GOS. Consistent with this logic, the end-of-project targets emphasized staffing, training, and performance improvements in the Health Inspectorate (HI) and Health Education Unit (HEU) of the Ministry of Health (MOH) and in the Rural Water Supply Board. Other targets concerned coordination of health, water, and sanitation initiatives both centrally and at the field extension level

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[1] Moreover, there was the confidence expressed in the original Project Paper that "by 1990, virtually the entire rural population (of Swaziland) would have pipeborne water if current planned implementation rates for the early 1980s are continued." The PP concluded that "*No additional interventions would appear to be needed for the actual delivery of pipe-borne water*" (emphasis added) The current GOS goal is to reach 50 percent of the rural population with safe water by 1991 This goal seems achievable, in no small part due to the contribution of the RWBDC project over the 1986 to 1989 period.

In 1986, a small grant of $200,000 was given to the RWSB for water system construction. The resulting implementation of eight water systems serving 9500 people within a short time frame near the end of the initial project provided attractive tangible benefits, but also highlighted the need for closer coordination with other agencies, particularly the Health Inspectorate.

Based on these realizations, $2 million in USAID funds and close to $700,000 in GOS support was added to the project in 1986 for a three-year extension. The project was given a new focus on rural water supply and sanitation, keyed largely to funding construction and rehabilitation of water systems and latrines.[2] Long-term technical assistance continued to be provided by a public health engineer who actually served a much broader and more pivotal coordinating role. Short-term technical assistance and training were provided to the various agencies involved. Sectoral planning became a major focus of the technical assistance to provide a framework for coordinating GOS (and NGO and donor) activities in water, sanitation, and health and to build a basis for sustainability of project-related improvements. Another shift in emphasis was toward training field workers and others with community responsibilities in community participation, education, and mobilization dynamics and techniques.

Thus the purpose of the amendment was stated to *expand the capacity of the GOS to deliver effective preventive health services to combat water and sanitation-related diseases and to assist the GOS to reach its goal of providing one-third of the rural Swazi population with piped water supplies by 1995.*

The shifting emphasis reflected above is indicative of a certain flexibility attributed to this project in its ability over 10 years to respond to changing perceptions of needs and targets of opportunity. This evaluation assessed the validity of that perception as it explored project achievement in terms of institutional, health, environmental, community, and beneficiary impact (Section 2) and drew lessons learned for wider application (Section 3).

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[2] $1.138 million was provided for water system construction and rehabilitation alone. $71,000 was provided for latrine construction.

Chapter 2

PROJECT IMPACTS

2.1 Institutional Impact

2.1.1 Sectoral Development and Planning

2.1.1.1 Organization of the Water Supply and Sanitation Sector

Public responsibility for planning and implementing water supply and sanitation programs in Swaziland is placed in two government ministries. The Ministry of Natural Resources, Land Utilization, and Energy (MNRLUE) deals with the conservation and protection of water resources, the provision of drinking water to communities, and the removal and disposal of urban wastewater. The Ministry of Health (MOH) promotes the general use of clean water and the hygienic disposal of wastes in homes and public buildings. Several NGOs implement water supply and sanitation programs, and some have participated with government agencies in sector planning and coordination units. The involvement of two such organizations, Emanti Esive and the Council of Swaziland Churches, was facilitated by the RWBDC project.

Five units in the MNRLUE are concerned to one degree or another with water supply and sanitation in Swaziland, but only one, the Rural Water Supply Board, has a direct mandate to provide rural water supply for domestic use. The RWSB was established in 1979 to implement and maintain rural water supply schemes and to guide other public and private agencies engaged in similar work to ensure compliance with acceptable design, equipment, and water quality objectives. The RWSB's specific responsibilities in the RWBDC project included source investigations, water system design, system construction, mobilization and training to support community involvement, system maintenance, and water quality surveillance.

The RWSB cooperates with the MOH in rural areas. In particular, two units of the MOH are concerned with drinking water and sanitation. The Health Inspectorate (HI) was established to promote clean water and sanitation, to assist rural communities in building latrines and small spring protection, and to provide health education to encourage correct use of drinking water and sanitation facilities. In support of the RWBDCP, the HI's objectives included promoting the importance of clean water, sanitation, personal hygiene, and supporting community organization, especially for improvements in sanitation

The Health Education Unit (HEU) was created to promote behavioral changes to reduce the incidence of major health problems, including those related to water-borne diseases and sanitation. In the RWBDCP, HEU's roles included promoting health education through

media and poster campaigns and assisting MOH program staff with methods for the effective delivery of health education.

In order to promote and coordinate water and sanitation activities, a National Action Group (NAG) was created in 1979 with responsibility for planning and coordinating sectoral development. This group consisted of the principal secretaries (PS) of the Ministries of Economic Planning, Home Affairs, Public Works, Health, Agriculture, and Education. The NAG initially was chaired by the PS of Public Works with the PS/MOH serving as vice-chairman and the Chief Engineer of the RWSB (then part of the Ministry of Works) acting as secretary.

The NAG was given an extendable 10-year mandate but no specific budget. A Technical Sub-Group (TSG) of the NAG was set up in 1985 as a working group to assist the NAG in operational matters. Its membership was drawn from government agencies and NGOs involved in water supply and sanitation and consisted of senior operational officers who understood the needs and capabilities of their own agencies, the scope for planning and joint action, and the realities of implementing programs in Swaziland. The composition of the NAG was altered over time to accommodate changes in ministerial responsibility (for example, the creation of the MNRLUE). In recent years, the RWSB has provided secretariat functions for both the NAG and TSG. The nominal chairman of the NAG is the principal secretary of the MNRLUE.

The RWBDC project contributed during its life to the performance of each of the GOS agencies and coordinating bodies noted above. In addition to supporting the construction of rural water systems, the project supported movement toward sector planning and coordination goals by providing both long and short-term technical assistance. The long-term public health engineering adviser played a wide-ranging role with all of the project agencies. Short-term technical assistance was provided in the areas of sector planning, human resource development planning, and RWSB program monitoring and evaluation. The sustainability of many of these project contributions is, however, in doubt due to a frequent lack of counterparts and the tendency of TA personnel to play a "substitute" rather than "facilitator" role in operational matters. As one key Swazi government staff member remarked, "[The Public Health Engineering Adviser] took care of things; we relaxed." Another said, "When [the PHEA] left, everything fell apart."

2.1.1.2 Sectoral Planning

From the beginning, the RWBDC project identified planning for development of the water supply and sanitation sector in Swaziland as essential to successful development and achievement of national health goals. As the project progressed, sectoral planning was accepted as necessary for effective management and coordination in the sector and for attracting external support for balanced sectoral development.

Various starts at sectoral planning were made prior to the RWBDC project, but none were comprehensive in scope nor provided a solid base for external technical assistance and funding support With the establishment of the TSG in 1985, serious sectoral planning began This effort received major support from the RWBDC project in the form of short-term technical assistance with the preparation of a work plan for the planning process, presentation of a national seminar on water and sanitation policies and strategies (April 1986), preparation of a national policy and strategy for sectoral development (June 1986), and preparation of a draft two-year action plan (June 1986).[3] The policy statement and the action plan were revised and updated in 1989; the new plan covers the 1989 to 1992 period.[4]

Assisted by the active coordinating role of the PHEA and other technical support provided by the RWBDCP, the TSG achieved a great deal in the 1985-1989 period. The policy and strategy document provides clear guidance for planning and implementing sectoral development and establishes clear targets, both physical and institutional [5] A structure of coordination is established that guides present sector activities, especially for the RWSB and I II The RWSB also has used the policies and strategies to coordinate the activities of NGOs in the sector. The two- and three-year action plans provide a framework consisting of "program elements," related budgets, and timetables for their execution These elements fall into categories of construction, program and project support, and evaluation and planning Among other things, these elements provide a basis for GOS budget allocation and for external funding and technical support [6]

Thus the institutional base for sectoral planning was well established as a result of RWBDCP inputs, at least on paper. Awareness of the strategy and plans is widespread among key GOS actors in the sector. Some sense of ownership is evident, in contrast to notable lack of awareness or use associated with others of the short-term technical assistance efforts

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[3] The plan received formal cabinet approval in July 1986.

[4] This plan coincides with Swaziland's national development plan. The nation's fourth five-year plan expired in 1988. The fifth plan moved toward "rolling development" in which a three-year plan will be updated annually

[5] Targets for physical system development and coordination were intertwined. By linking water supply assistance to local latrine construction, sector planners promoted a substantial increase in the rate of latrine construction.

[6] USAID supported the policy guidelines for sectoral development as well as specific activities identified in the two-year action plan The RWBDC project paper amendment links each category of assistance to one or more of the 19 program elements

linked to the project [7] Nonetheless, even this initiative has foundered since the departure of the PHEA. We are told that the TSG has not met in the past year; the NAG, under whose aegis the TSG exists, has not met formally since 1982, and its legal mandate expired in 1989. While the current three-year plan still provides a relevant base for implementation decisions, there are few grounds for confidence that there will be a mechanism for ongoing master planning in the future. The value of a one-time burst of planning is significant at present, but it risks being a case of diminishing returns.

2.1.1.3 Coordination

Through the sectoral planning process and in other ways noted below, the RWBDC project supported the establishment of shared water supply and sanitation objectives and operational mechanisms to coordinate the efforts of key agencies in the sector. Linkage and coordination are of particular importance to achieving the potential health benefits of water and sanitation.

Actual coordination of the government units involved in the RWBDC project was greatly facilitated by the PHEA who maintained a close and supportive relationship with each of them. Indeed, a level of dependence was created that hindered institutionalization of sustainable processes of coordination. As noted above, the NAG and TSG, key points of strategic coordination, are now dormant, even if a policy basis for coordination remains. The mechanistic but effective water supply/sanitation link provided by the latrine construction prerequisite for water system installation remains in place and appears to be widely accepted.

Day-to-day coordination at the central level, however, is now limited to the periodic presence of a health inspector in the offices of the RWSB. This person has no clear role and no one to report to within the RWSB. The MOH now questions the utility of this arrangement. The arrangement has been useful for operational problem-solving but is not sufficient to maintain strong policy and planning coordination. Concerns about this problem were expressed to us both by donors and by Swazi officials, some of whom felt that, in the absence of prodding by the PHEA, the RWSB is not interested in sanitation.

Field-level coordination is both more routine and more effective. In addition to water and sanitation sector cooperation in the training of rural water committees, there appears to be

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[7] In the absence of an institutional contractor (the PHEA shifted to a Personal Services Contractor arrangement during the project extension and was the sole long-term adviser in the 1986 to 1989 period), much of the short-term TA was provided by the AID centrally-funded WASH project. While of high intellectual quality, some of this work was not rooted in the administrative realities of Swaziland and has been of little apparent utility to implementing agencies on the ground.

a good level of informal teamwork between district community development officers (CDOs) from the RWSB and district health inspectors and health assistants from the MOH, especially when their offices are located in the same town.

In general, coordination would be served by more information sharing. This is constrained by the lack of functional information systems on water supply and sanitation matters in either the HI or the RWSB. Certain data are collected to meet various GOS and donor reporting requirements.[8] There is little evidence, however, that any of this information is aggregated or used for management purposes. There is no summary information, for example, on how many people are served by new water systems or how many latrines have been built. From the available evidence—or, in fact, its lack—it appears that the RWBDC project made little contribution to institutional development in the area of management information collection and use.

Coordination with the private sector was not a central goal of the RWBDC project or its extension although the intent to do more private sector contracting was noted in the PP amendment. In fact, the private sector has not made a significant entry into the rural water and sanitation arena outside of consultants and construction and drilling contractors who serve government agencies and NGOs that are installing systems. Emanti Esive, the Council of Swaziland Churches, and other donors are seeking out local suppliers of pumps, but this was not the practice of the RWSB or the USAID project.

2.1.2 Health Institutions

Health-related agencies in Swaziland can be divided roughly into a "modern" sector and a traditional sector. The modern sector is composed of government health services, private for-profit clinics, mission clinics (many with outreach), and company health services organized by the major agro-industries for their employees. The current list of units reporting monthly to Medical Statistics includes 369 names, of which 145 provide clinical (curative) services. The 53 clinical units of the MOH are organized into four Regional Health Management Teams and form the backbone of public health services in Swaziland. RWBDCP interacted with several of the MOH programs, particularly during the period of the original project. The evaluation team sought to assess the impact of that interaction.

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[8] One useful form, for example, is a Project Initiation Sheet prepared as a USAID requirement for each RWBDCP-supported system. This form contains site data, beneficiary information, and system specifications and is the primary basis for the information summary we compiled for Appendix E. These forms are scattered among central and district files and, in some cases, missing. They do not appear to be used once their purpose as a USAID routine has been achieved.

In addition to the modern health sector, Swaziland possesses a remarkably well-organized cadre of traditional healers, estimated to number 5,000, who continue to provide parallel services, particularly to the rural population of the country. Contacts between the project and the traditional health sector were established early in the 1980's and developed through seminars involving both modern and traditional personnel and through the use of shared health education messages and materials The connection since has been exploited by other government health initiatives The project has had a definite impact on the traditional health sector, particularly at the interface with the modern sector. An attempt was made by the evaluation team to assess that impact

The Project Paper identified health education, schistosomiasis (bilharzia) surveillance, and water supply and sanitation as the primary areas of activity to be undertaken by the project. Within the MOH these were areas of responsibility of the Health Education Center (usually referred to as the Health Education Unit, or HEU), the Bilharzia Control Unit (BCU), and the Health Inspectorate (HI) respectively For purposes of evaluating the institutional impacts of the project within the health sector, it was to these organizations and the Traditional Healers' Organization the evaluation team looked

2.1.2.1 Health Education and the Health Education Unit

At the inception of the project, health education was identified as the key method by which the rural population of Swaziland would be motivated to alter their behavior in ways that would promote and improve their own health At that time the HEU was not a formally constituted division within the MOH and was, by all accounts, relatively weak, untrained, and inexperienced The project constructed the present HEU building, provided vehicles and materials, provided both long and short-term technical support, and provided formal and on-the-job training for the personnel.

The HEU today is well-institutionalized within the MOH It sees its function as providing materials and training in response to requests from the various programs of the ministry. In particular it produces posters and radio messages and serves a coordinating and clearinghouse function It does not have field staff, the actual transmission of the messages face-to-face being the responsibility of the clinic nurses, Rural Health Motivators (RHM),[9] and the Health Inspectors (HI) and their Health Assistants (HA). The HEU hopes to open regional offices within the next few months, now that sufficient staff are available

The HEU works with, and receives support from, numerous MOH and donor-funded activities, including other USAID-supported projects It is impossible to measure the extent

[9] RHMs are part-time community health workers who come from the community itself and visit periodically about 40 homesteads each They are supervised by the nearest clinic nurse

to which the current strength of the HEU can be attributed to its association with the early RWBDC Project, but the impact was clearly helpful. The director of the HEU considers the principal contributions of RWBDCP to have been the participant training it provided and the materials development it supported. The HEU is considered within the MOH to be a well-supported agency, staffed with reasonably competent people.

Several studies have indicated recently that health education messages are reaching the target population. A 1989 Combatting Childhood Communicable Diseases survey asked mothers bringing children with diarrhea to Government Hospital in Mbabane whether they had started ORT before coming Fully 75 percent had started the use of packets, and 20 percent with a sugar-salt solution. All the mothers the evaluation team encountered in the field seemed familiar with oral rehydration therapy.

A knowledge, attitudes, and practices (KAP) study that grew out of a WASH consultancy in 1988, with funding by the PHC Project and analysis by the Social Sciences Research Unit at the University of Swaziland, asked 810 heads of households throughout the country what verbally transmitted health messages they recalled The most frequently named topics are shown in Table 1.

Table 1

Verbal health messages recalled by heads of households
(1988 Health Education Impact Survey)

(none)	16 1
Toilets	8 9
Family planning	8 0
Immunization	7 1
Alcohol	6.3
Diarrhea	6.3
Health (general)	6.3
Food hygiene	6 3
Home hygiene	6 3
Water	5 4
Nutrition	4 5
Accidents	2 7
Pregnancy	2.7

Respondents were also asked from whom they received these messages. The replies appear in Table 2.

Table 2

Sources of verbal health information recalled by heads of households
(1988 Health Education Impact Survey.)

(none)	51.8
Nurses	25.0
RHMs	4.5
MOH	3.6
HI	2.7
FLAS	2.7
Teachers	1.8

Additional questions were asked concerning the messages recalled from posters. None of the respondents mentioned water or sanitation.

A subset of chiefs and deputy chiefs were asked to describe the major health problems they perceived; 46 percent of their responses related to clinical services and their access; 27 percent related to water access and quality; 15 percent related to toilets.

Although no data were found by which to measure the impact of RWBDCP on the transmission of health messages in Swaziland, these data are cited to demonstrate that health messages are being communicated to the population, and that messages concerning water and sanitation constitute a significant proportion of those messages.

The HEU is active in the production of posters, and CCCD has shown the effectiveness of its radio messages in their malaria program. That these modalities are not reflected by the survey cited is probably due to the structure of the survey itself (not entirely clear in the published report).

During the 1986-89 project extension, the HEU received little support from RWBDCP. Of the $80,000 originally proposed, and the $20,000 actually budgeted, only about $2,000 was utilized by the HEU (for flip charts that still are not available for use). The expectations of the project may have been unrealistic (there are indications that the HEU was less tractable than the RWSB would have liked). The unit was active, however, in a variety of non-project programs throughout that period.

In sum, the HEU appears to have been significantly strengthened by its connection with the original phase of RWBDCP It is now a viable institution within the MOH.

2.1.2.2 Schistosomiasis and the Bilharzia Control Unit

The BCU was created during the time of the British Protectorate to coordinate the surveillance and control of schistosomiasis throughout the country. Since the inauguration of the project, the disease may have declined somewhat as a matter of concern to the health authorities inasmuch as it can now be treated quite effectively and safely, thanks to the development of the drug Praziquantal It remains an important public health problem in Swaziland, however, and the BCU continues its surveillance, testing, and treatment.

The project initially associated itself with the BCU in order to perform a national survey of Swaziland to determine the distribution of schistosomiasis, and the snails that constitute its intermediate hosts, so that the health behavior and water and sanitation interventions of the project could be focused where they might be expected to have maximum effect. To this end the project contributed TA assistance, on-the-job training, materials and supplies, and expansion and renovation of the BCU laboratory to strengthen its institutional capability.

The national survey was completed in 1984 and found areas in the middleveld and lowveld to be seriously affected. The middleveld (areas between 1,500 and 3,500-ft. altitude) was found to have many scattered foci of transmission of *S haematobium*, the organism responsible for urinary schistosomiasis and which is transmitted by eggs passed in the urine of persons infected with the disease The lowveld (600 to 1,500-ft elevation) was found to have significant transmission of both the urinary and intestinal types of schistosomiasis, the latter transmitted by the eggs of *S. mansoni* which are passed in human feces. The portion of the lowveld along the course of the Lomati River was found to have particularly high rates of infection of both types. As expected, the highest rates of infection were found in school-age children. The areas of greatest concern for schistosomiasis control were thus elucidated and available to guide water and sanitation activities. Methods of ongoing surveillance were established, using selected schools as sites for case finding and treatment among the population most affected. The BCU has continued in much the same role since that time.

The evaluation team sought to determine whether knowledge of the distribution of schistosomiasis was subsequently used to select priority areas for the development of safe water systems. When the current professional staff of the RWSB were queried about the criteria by which they decide where to direct their efforts, they indicated that such knowledge of health factors plays no role If the community has schistosomiasis, that should motivate the community to organize itself and collect the money needed to show the RWSB that it is ready for a modern water system.

In discussions with the HI personnel assigned to work with RWSB centrally, there was no indication that schistosomiasis is a concern of theirs either. When the specific case of Mbekelweni was mentioned (whose water committee had informed us that they had decided that the women should continue to use the river for washing clothes and for some bathing), the HI staff replied that is a problem for the BCU. The evaluation team concluded that, while the pieces are all in place, the institutional connection between the RWSB and the BCU envisioned in the design of the project does not exist.

In an effort to determine indirectly whether the distribution of schistosomiasis may have influenced the selection of sites for water system developrnent in the past, the number of projects and their populations were grouped by geographic zone. As can be seen in the following table, the preponderance of systems were indeed placed in the zones where they might interrupt schistosomiasis transmission. It is not now clear, however, whether that happened by chance or by design.

Table 3
RWBDCP water projects by geographic zone

	Communities		Population	
Zone	No.	%	No.	%
Highveld	8	15	4,085	8
Middleveld	29	56	31,025*	60
Lowveld	15	29	16,944*	32
TOTALS	52	100	52,054	100

* Population figures for 5 MV and 2 LV communities missing, so actual MV and LV populations may be understated.

We can reasonably estimate that the provision of safe water supplies by the RWBDC Project has largely eliminated the need for contact with schistosomiasis-contaminated water for at least 10% of the rural population previously at risk in Swaziland. Whether such contact has actually been reduced is a behavioral question that will be addressed below (Sec. 2.2.1).

2.1.2.3 Sanitation and the Health Inspectorate

The public health system in rural Swaziland is staffed by two parallel cadres of health personnel. Curative services are provided by nurses, with ancillary personnel, who staff the clinics and supervise the Rural Health Motivators. Preventive services requiring field work are the responsibility of the Health Inspectorate. Thus, the promotion of the proper disposal

of human excreta through the construction of pit latrines, the one major activity identified in the Project Paper which continued throughout the life of the project, became the responsibility of the HI system.

The promotion of latrines and limited provision of safe water were responsibilities of rural-based HI personnel before the advent of the RWBDC Project. Spring protection was the principal method practiced by the HI to provide safe water.[10] The ventilated improved pit (VIP) latrine with a cement slab was the preferred model for latrines. With an annual budget for the combined activities that remained at E.15,000 (US$6,000) for many years, progress was understandably slow. Problems of transporting personnel and materials to rural sites were additional limiting factors. The project offered help in the form of construction materials, coordination with the RWSB and its vehicle fleet, and near the end of the project, field vehicles for the HI itself.

Institutionally, the primary impact on the HI was probably the coordination with the RWSB, particularly at the district level. For the HI this resulted in a much stronger program. Not only were they able to coordinate better with the project communities, share promotion and supervision responsibilities with RWSB staff, and provide sufficient material support for the construction of many more latrines than ever before, but they discovered an effective method to motivate community members to construct latrines when they linked latrine construction to the start-up of water systems.

The completion of latrines in a certain percentage of the homesteads of a community became a prerequisite to water system development. This had implications both for individuals and for cooperation within the community. The members of a community that wanted a water system, a project almost certainly beyond their capabilities without outside support, were strongly motivated individually to construct latrines at their homesteads. On the community side, the preliminary efforts required to collect a sizeable fund and to construct latrines served to commit the members of the community to the water system project, a shared commitment that would be essential for sustainability and maintenance.

From the perspective of the Health Inspectorate, a major impact was a greatly increased capacity to construct latrines. Evidence that this was valued positively by the MOH is seen in the annual budget figures. For the year following the close of project, the HI budget for sanitation was increased from E.15,000 (US$6,000) to E.145,000 (US$58,000). Next year's budget will be E.160,000 (US$64,000).

The evaluation team sought to determine to what extent a health consciousness had been fostered within the water supply sector by the project public health engineer and the HI. In

[10] The HI did, in coordination with overall MOH policy, promote the boiling of drinking water during the time of the cholera epidemic, but that has not been strongly promoted since then.

the absence of a PH Engineer within the RWSB, formalized health-based requirements might be found, and signs of public health consciousness were actively watched for. However, aside from the latrine requirement and the presence of the HI, whose role appears to be limited to latrine construction, no enlarged public health perspective was apparent. A disinterest in local health problems at the planning stage has already been noted, as has the fact that any concern for water use that might contribute to the transmission of schistosomiasis is considered the responsibility of the BCU (and the community). The RWSB engineers were not concerned about pools of standing water around the sand filter installation at Nkwene, water that could breed mosquitoes. The Emanti Esive representatives felt that the RWSB (and the RWBDC Project) applied a very restrictive notion of how the water could be used. They understood that RWSB considers it strictly for domestic use, and that using water for community gardens, an activity promoted by Emanti Esive and reflecting a public health concern for nutrition, is considered inappropriate.

In summary, the project's public health impact on the RWSB appears to have been narrow, limited essentially to the insistence on latrines and health education by the appropriate health authorities. The RWSB appeared satisfied to find someone else to be responsible for public health concerns, relieving them of any such responsibility. The integrated public health engineering perspective anticipated by the project does not appear to have developed.

The project had significant impacts on the Health Inspectorate. They were able to increase markedly their production of VIP latrines and to develop personal working relationships with their RWSB counterparts which continue to facilitate coordination in the water and sanitation sector.

2.1.2.4 Traditional Health Sector

Because the improvement of behavior practices relating to water and sanitation were seen as essential to accomplish the goals of the project, a KAP survey was completed in early 1982 to serve both to define a baseline and to guide project activities in health education. The KAP exercise and searching for the most appropriate avenues of health communication led to an appreciation of the continued importance of traditional health practitioners in rural Swaziland. Contacts were made with Nhlavana Maseko, a prominent traditional healer and president and founder of the Traditional Healers' Organization who had been encouraged by King Sobhuza II to coordinate the work of the traditional healers in Swaziland and to cooperate, where possible, with the MOH.

The project arranged conferences and training sessions between MOH personnel and traditional healers, and health education materials in siSwati were produced that would be appropriate to their use. The traditional healers were particularly concerned about cholera when an epidemic occurred in 1981-82. They became active in the dissemination of health messages concerning clean water, sanitation, and oral rehydration therapy. They were

encouraged to spread appropriate messages and to refer people to clinics as needed. Evidence of the institutional link that was established between the traditional healers and the modern sector is the existence of an MOH referral form designed specifically for the traditional practitioners.

Traditional healers do not appear to have been involved in any organized fashion with the project extension. They complain, in fact, that monies earmarked to support their activities were diverted towards the end of the original project to MOH activities. Nevertheless, they have continued to work intermittently with NGOs and the MOH. Nhlavana Maseko is a member of the national committee overseeing AIDS activities in Swaziland, and he is in regular contact with health authorities in Siteki where his clinic and conference center is located.

Bringing the traditional health sector into contact with the governmental sector in Swaziland, to the point where they can work toward the same goals (See the recent statement on "Traditional Primary Health Care" reproduced as Annex F) was clearly a product of the project. That coordination, if awkward and somewhat intermittent, persists and has important implications for public health in Swaziland. If traditional healers are to improve their practices -- and recent data from the Combatting Childhood Communicable Diseases Project shows that traditional healers constitute a risk factor for childhood mortality -- then coordination between the traditional and modern sectors is essential. That may well constitute a major impact of the RWBDCP.

2.1.3 Public Health Engineering

The RWSB specializes in the development, construction and maintenance of rural water supplies systems. The engineering capability of the RWSB to design and construct appropriate rural water supply systems was well established prior to the RWBDCP. The project aimed to link the RWSB technical engineering component with the health and sanitation efforts in water supply and sanitation through the expertise of public health engineering.

The public health engineering component of the RWBDCP, as called for in the 1979 Project Proposal, had two major objectives:

1. strengthen the institutional base for implementation of environmental health programs by establishing an official public health engineering presence in the GOS; and

2. expand the GOS's awareness of, and capacity to prevent water-associated diseases, while at the same time developing its rural water resources.

The goal to establish a public health engineering presence in the GOS was accomplished in 1983 with the establishment of the Public Health Engineering Unit (PHEU). Although originally expected to be located within the MOH, the PHEU was placed within the RWSB. This provided an opportunity for professional development within an organization and ministry providing a career structure for engineers. It also placed the Public Health Engineer (PHE) in the ministry directly involved in the development of water resources. The PHEU was charged with the following tasks:

1. assist the RWSB and MOH to design water supply and other water resource development projects so as to minimize health risk and provide optimal health benefits;

2. advise the GOS on the health aspects of development projects;

3. advise the MOH on environmental health problems; and

4. serve as a liaison between the RWSB and the MOH.

The challenges were 1) to define the role of the PHE clearly, 2) to establish an institutional framework within which the PHE could work effectively, and 3) to involve the PHE as a resource available to and actively serving all relevant units of the government.

The Public Health Engineering Advisor (PHEA) arrived in October 1981. The 1986 external evaluation of the RWBDCP recognized the pivotal role played by the project in strengthening the RWSB through the technical assistance of the PHEA. On the basis of this successful experience, the 1986-88 extension of the RWBDCP provided assistance to the RWSB to further strengthen and expand the PHEU by continuing the services of the PHEA. Training of a Swazi Public Health Engineer to replace the project TA was to be an important part of this extension.

To implement this element of the project, technical support and guidance were to be provided to the Swazi Public Health Engineer by the PHEA while he continued to serve a role in coordinating the linkages between key government agencies. The PHEA also had responsibilities in training, sectoral planning, strengthening the role of the PHEU, and work planning. These roles were interrelated, aimed at establishing public health engineering within the RWSB as a viable unit with a well-defined mandate and functioning links with other agencies.

The mid-term evaluation of the RWBDCP extension (December 1988) noted that the PHEA was a driving force for coordination, linkage, and planning among the various agencies involved in the project. The same evaluation expressed concern about the gap between the return of the Swazi PHE (sent to Australia for training in 1988) and the departure of the PHEA in September 1989. Without either of these individuals, there would be no available

Public Health Engineer to fulfill the job requirements. Based on this concern, two six- month extensions of the PHEA were provided in 1988-89 to maintain the momentum of the PHEU in the absence of the PHE.

During the extension, the PHEA expanded the scope of PHEU beyond water into the domain of environmental health. He served on the Human Settlements Authority to assure recognition of environmental health issues in physical planning, and was instrumental in the establishment of the Environmental Health Planning and Coordinating group, where the development of a national policy on toxic and hazardous wastes was initiated. Given this range of responsibilities, it was planned that the PHEA would have ample time to train his Swazi counterpart before the end of the consultancy. In reality, the counterpart returned from his training after the PHEA had departed and then went on extended leave. He is not expected to return and, because he is on leave, there is no mechanism by which to replace him.

In any event, the PHEA had limited success in turning over responsibilities before his departure in September 1989. Information from numerous players in the RWBDCP highlights this loss of opportunity to transfer the extensive PHEA job responsibilities to a Swazi counterpart. Particularly in the areas of technical support, project coordination, and project management, gaps have been noted since the departure of the PHEA.

The Water Quality Laboratory, which was directed by the PHEA, supports the RWSB by monitoring the water quality of existing rural water systems and analyzing groundwater samples. The lab's two staff members both expressed concern about the lab's ability to function without the technical assistance of the PHEA. He was their sole source of technical assistance and was able to obtain reagents and supplies which they are now unable to obtain through government channels in a timely fashion. Currently, the lab is running out of several important reagents (for fluoride analysis, for example) and awaiting supplies which have been ordered for months. Morale is low and the staff are discouraged with apparently no one to turn to with these problems.

The Health Education Unit also observed that the PHEA's departure had left a gap in their agency. They indicated that the PHEA had provided guidance in choosing and developing health education materials. Furthermore, the HEU observed that there has been less coordination of activities with the RWSB since he left.

The Senior Engineer of the RWSB added that he receives many requests calling for the input of a public health engineer, and he finds that these requests are beyond the technical expertise of his staff. The RWSB views the PHEU as an important component of their work.

Finally, management of information was important to the RWBDCP. During the project extension several WASH consultancies attempted to develop tools for effective information

management. Consistent with this effort, end of tenure reports by the PHEA indicate that he established a computer-based inventory system for water systems and for latrine construction. These inventories were not in use during our stay, and when we attempted to find latrine completion figures, both as a measure of project impact and to learn how the RWSB documents satisfaction of the latrine construction prerequisite, the RWSB could supply none and the HI only partial data. We saw this as an additional indication of dependence on the PHEA and the gaps left with his departure.

In summary, the PHEA was relied upon heavily for technical assistance and project management functions during the RWBDCP. His presence was noticeable in almost all aspects of the project, and he is credited with playing a pivotal role in the coordination of the RWSB and MOH. In addition, he expanded the role of the PHEU to include other responsibilities in the field of environmental health. It is difficult to ascertain how much of this capacity was transferred to the RWSB, in part because of the departure of the Swazi PHE, but more broadly because of the degree of dependence on the PHEA that developed during the project extension. Whatever the cause, the result has been a breakdown in coordination efforts between the RWSB and the MOH and an absence of a public health perspective in the RWSB.

2.2 Health and Environmental Impact

2.2.1 Health Status and Behavior

The goal of the RWBDC Project was to decrease morbidity and mortality in rural areas of Swaziland by reducing the occurrence of water-related diseases. The 1979 Project Paper (PP) observed that, "the majority of water-related diseases are the result of insufficient water supplies for adequate hygiene and contaminated drinking water. Schistosomiasis differs from these in that it can be contracted through contact with infected water." The immediate goal of the project was therefore "*to improve the water use/control and sanitation habits of the rural population.*"

Ideally, the health impact of the project would be reflected in improved health statistics. Incidence of diseases related to contaminated drinking water, such as acute diarrheal disease, dysenteries, and hepatitis A, should decline in areas where the project provided clean, plentiful, and readily accessible water, sanitary latrines, and greater knowledge of healthful sanitation practices. Similarly, prevalence of schistosomiasis should have decreased as latrine use and avoidance of infected water increased. Although confounding variables such as increased home use of ORT during the period of the project would render the reduction of disease impact of the project impossible to measure precisely, we attempted to find disease incidence and prevalence indicators that might at least reveal trends. As described below, that approach produced unconvincing results.

The PP suggested that, if change in health status should be impossible to measure, it ought to be possible to demonstrate changes in behavioral patterns of water use/contact and sanitation. Studies focusing on source of drinking water, food preparation practices, hand washing, bathing practices, and latrine use would measure health-related behavior. KAP studies at the beginning and end of the project would provide such information. The PP proposed the number of latrines constructed as a surrogate for more direct measures of improved sanitary practices.

An excellent first KAP study was carried out in 1981-82, but the repeat study was never done. The impact evaluation looked therefore for comparable information from other surveys conducted in Swaziland in recent years and for detailed latrine construction or use data. What limited information could be gleaned is discussed below. We believe that the failure to carry out a repeat KAP study was a serious omission by the project. There are indications from people we interviewed that behavior did change, and that project activities contributed to that change. Without the final KAP, however, the magnitude of that change cannot be determined. We are left with hints and indirect indicators of impact.

2.2.1.1 Diarrheal Diseases

The team selected numbers of children with acute watery diarrhea as the most practical indicator to follow because sufficient numbers of cases should be available to permit analysis and because such figures are reported monthly by clinical facilities throughout Swaziland. An attempt was made to match up the areas of project focus, the rural water schemes, with "under fives" diarrheal disease incidence as reported by clinics in those areas. Four of the project communities have clinics, but statistics covering the period surrounding the installation of their water systems were available only for Mshingishingini and Nkwene. Figure 1 shows reported under fives incidence of acute diarrhea in those two communities.

The Mshingishingini figures show no trend, but the Nkwene data show a remarkable decrease in childhood diarrhea since the water system was inaugurated (indicated by the arrow). Obviously, such scanty data must be regarded with extreme caution. To look for additional confirmation of this trend, diarrhea incidence in ages five and above were also graphed for Nkwene (Figure 2).

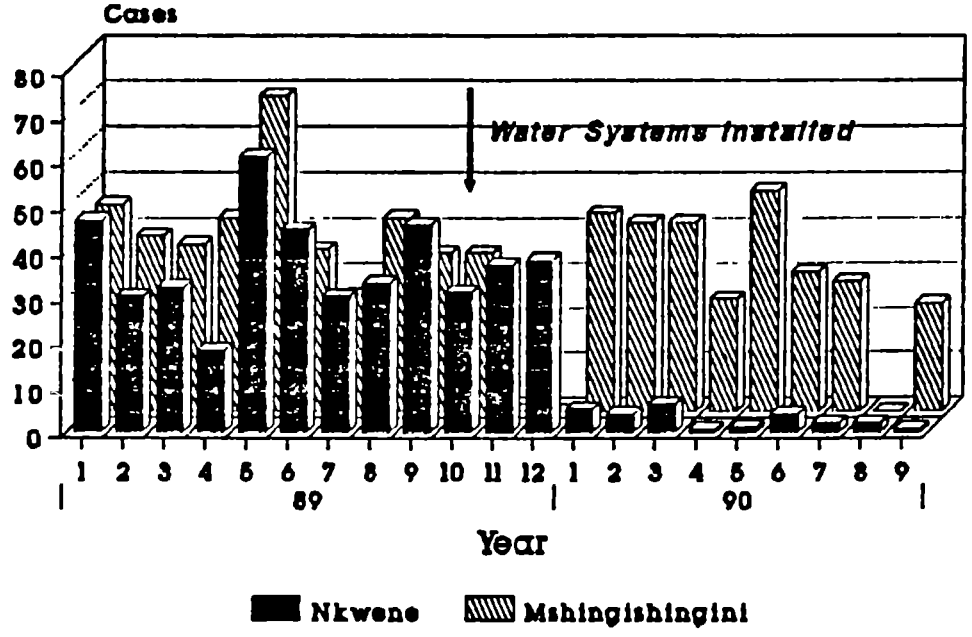
It is difficult to explain why young children, but not older children or adults, should show an effect. The only honest conclusion that can be drawn is that no clear pattern is evident yet in these two communities.

A better study, but one that does not permit disaggregation of the data for the RWBDCP communities, was the 1988 Swaziland Family Health Survey. Diarrheal disease prevalence in "under fives" was surveyed and analyzed according to rural or urban areas and type of water source. A prevalence rate of 21 7 percent was found in rural areas having piped

water, compared with 26.7 percent in communities with wells and 23.9 percent in those having a water source described as "other." Considering that over 10,000 children were surveyed, these differences are meaningful. Children under five in rural homesteads served by piped water have a significantly lower rate of acute diarrhea than rural children in areas without piped water.

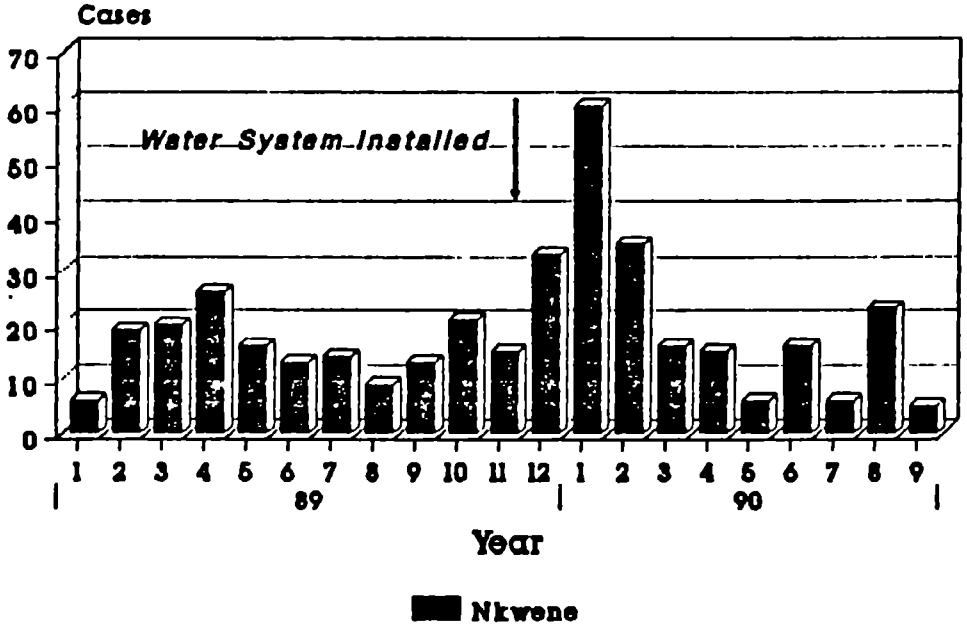
Prevalence in "under fives" was also analyzed by type of toilet facility. Excluding flush toilets, there was a difference of less than 1 percent between children in homesteads with latrines and those classified as "other." We have no data to suggest that latrines decrease diarrheal disease in rural Swaziland.

Figure 1
Diarrhea Incidence in Under 5s



Note: No data for Mshingishingini, 11/89, 12/89, 8/90

Figure 2
Diarrhea Incidence in Over 5s



2.2.1.2 Schistosomiasis

The Bilharzia Control Unit carries out school surveys to identify and treat children with schistosomiasis. Such surveys can be viewed as a sentinel surveillance system. Data from schools in RWBDCP water system communities are grouped below.

Table 4

Prevalence of *S. haematobium* from school surveys in communities having RWBDCP water systems
(Source: BCU, Manzini)

Community	Water System Completion	Prevalence Rates 82	83	84	85	86	87	88	89	90
Ntabinezimpisi	9/89									
Primary school			.98		.72	.41		.70	.44	
Secondary school			.52		.39	.25		.28		
Mshingishingini	9/89									
Primary school			.53		.56	.20	.21	.40		
Mavula	9/89									
Primary school				.64	.22	.23	.34		.44	
Ntsinini	9/89									
Primary school										.79
Mbekelweni	86									
Primary school			31					.27		.46
Mafucula	7/89									
Primary school										.81
Tsambakhula	11/88									
Nazarene primary			1.00							.86

Since most of these systems were completed at the end of 1989, it is too early to see a reduction in *S. haematobium* prevalence rates. A data collection system exists, however, that should eventually be capable of demonstrating any such trend.

S. mansoni prevalence rates are only available for Tsambakhula (and a few imported cases at Mbekelweni). The prevalence in Tsambakhulu school children in 1982 was 52 percent. In 1990 it is 6 percent. Much of that reduction is due to treatment programs. The contribution of improved water and sanitation cannot be teased out.

2.2.1.3 Measuring Health Behavior

The KAP survey completed by the RWBDCP in 1982 asked very pertinent questions regarding practices relating to water and sanitation. Among the findings from that survey were the following:

- 26 percent of rural homesteads had a safe source of water.
- Prevalence of latrines by ecological zone was found to be:

Highveld	39%
Middleveld	31%
Lowveld	12%
Lubombo plateau	11%

- Most respondents without latrines were interested in having one if one or more restraints could be overcome (advice, materials, etc.).
- Having a latrine is positively associated with increased years of schooling, RHM visits, and family size of 7 or more.
- 31 percent of rural latrines at that time had cement slabs.
- 84 percent of children of families having latrines started using the latrine between 4 and 7 years of age.
- 82 percent of children urinate in the open; 12 percent in latrines.
- 50 percent of adults having latrines use the latrine to urinate.
- Chamber pots were present in 60 percent of homesteads.
- 90 percent reported washing their hands after defecating.

- 92 percent reported washing their hands before eating.
- 92 percent reported washing their hands before food preparation.
- Most rural people bathe 2 or 3 times per week.
- 72 percent of children and 46 percent of adults reported bathing in natural bodies of water.
- Approximately 80 percent of these children and 60 percent of these adults bathed in the middle of the day when the risk of schistosomiasis is elevated.

A KAP at the end of the project was expected to follow up on these data. However, the 1984 mid-project evaluation recommended observational studies rather than a KAP to avoid self-reporting bias. The observational studies proved impractical. The need for behavioral information was recognized near the end of the project when a WASH consultant reviewed existing information and surveys and planned a KAP. The KAP carried out in 1988 with PHC Project funding did not follow that plan, however. In fact, aside from factual data concerning water source, presence or not of a latrine, etc., only six questions constituted the water and sanitation portion of the study:

1. Are you satisfied with your water supply?
2. Give reasons for your statement.
3. If not satisfied, what are you doing about it?
4. Are you satisfied with your toilet?
5. Give reasons for your statement.
6. If not satisfied, what are you doing daily or regularly about it to protect yourself against diseases?

Not surprisingly, analysis proved difficult and the information obtained was rather limited. Data were sent to the Social Sciences Research Unit at the University of Swaziland for computer processing and analysis. A partial analysis was finally produced in 1990. What little behavior data we have comes from that report. It should be noted that urban and rural respondents were not separated for purposes of analysis. The findings:

- Approximately 50 percent of respondents reported using water from a "clean" source.
- 36 percent reported having pit latrines; 35 percent septic tanks; 27 percent use the bush.
- When asked who uses the latrine, 77 percent said everybody.

Anecdotal reports of health-related behavior were obtained from the community members interviewed by the team. They suggested that the importance of drinking clean water is widely appreciated, and the convenience of the RWBDCP water systems may be even more important to the people than the health benefits. People seem to value their water system more highly than their latrines. Those who have latrines, however, generally use them. Many rural people continue to use natural bodies of water for bathing. It has proven impossible to prevent children from swimming in such water, especially in the hot season.

In the absence of a proper KAP study, it is difficult to know whether such impressions are valid. It is fair to conclude that the impact of RWBDCP on behavior cannot be ascertained from existing sources of information. We believe that behavioral change has occurred, but it has not been objectively demonstrated. Likewise, we have no objective evidence to show that any of the project activities, aside from the placement of piped water systems, has had any effect on health indicators. We simply trust that health status has improved.

2.2.2 Environmental Sanitation

Since its inception, the project has linked provision of safe drinking water to protection of water sources from human wastes. The RWSB has required improved excreta disposal through the use of ventilated improved pit (VIP) latrines in communities receiving project water supply systems. Therefore, one important measure of RWBDCP progress in environmental sanitation is the rate of construction of VIP latrines in project communities.

Health education also was highlighted in the project extension as a pre-requisite for improved behavior related to sanitation. Pit latrine construction itself does not measure hygiene behavior and knowledge. Nor does it accurately portray demand, since latrine construction normally was mandated for communities requesting water systems. Empirical information regarding project impact on knowledge, attitudes, and practices in hygiene behavior would be useful but only project baseline information is available (see Section 2.1.2). In the absence of follow-up KAP data, evaluators must rely on anecdotal information, observations, and interview data regarding sanitation.

The GOS had initiated activity in environmental sanitation prior to the RWBDCP. From 1973-1977, the Environmental Health Division of the MOH participated in a program with WHO that trained health assistants to motivate rural people to finance and construct pit latrines. The goal was to build 1,000 latrines. The project fell far short of this goal for several reasons. Lack of transportation for staff and construction materials was paramount. The transportation problem led to motivational difficulties. Rural people who had dug their pits and prepared for construction were left disappointed and angry (given the danger of open pits) when construction materials were not delivered. While this situation predates the RWBDCP, it is important to note because similar problems arose during the project period.

The project extension set a target of 3,000 VIP pit latrines in communities scheduled to receive water systems. The mid-term evaluation of the RWBDC project extension found that as of August 1988, 2,123 pit latrines were in various stages of construction and only 315 were completed[11] (translating to 85 percent uncompleted starts). Transportation of staff and materials was considered the primary constraint to accomplishing the goal, the same problem encountered over 10 years before. Insufficient staff, particularly in the field, also was indicated as a hindrance. With the project-funded purchase of four vehicles in late 1988 transportation problems were alleviated and hopes high that more progress would be made on latrine construction. In fact, by the end of the project in September 1989, 1,405 VIP latrines had been completed in communities with RWSB-supplied project water systems. These were distributed among districts as follows: Hhohho - 245, Lubumbo - 296, Manzini - 348, and Shiselweni - 516. In addition, Emanti Esive constructed 72 VIP latrines in their project communities in Shiselweni and Lubumbo.

MOH Health Inspectorate staff observe that the late start in construction due to transportation problems and the shortage of staff led to the failure to meet the goal of 3,000 latrines. Additionally, inadequate field reporting led to under-reporting of latrines constructed. An unfortunate result of the lag in latrine construction was that the criterion to have 100 percent coverage of pit latrines in a community before the newly-constructed water supply system could be turned on was relaxed. The MOH says 80 percent latrine coverage was considered sufficient by the end of the project; the RWSB quotes 50-60 percent latrine coverage as acceptable.

Whatever the figure used, this compromise suggests that the full potential health benefits of linking water supply with sanitation were jeopardized. It also reflects the reality that community demand for sanitation lags behind that for clean water. Everyone to whom we spoke regarding rural Swazi perceptions of sanitation concurred that education was the key to increasing the demand for latrines. Despite intensive health education activities, however, many rural Swazis who request a clean water supply do not yet realize the importance of pit latrines.

The high percentage of VIP latrines with the pit and slab in place but no superstructure is further evidence of a lack of commitment at the community level. The superstructure is the responsibility of the homestead although the MOH sometimes will help pay for materials. Locally available materials can be used and no design is specified. It is hard to understand why a homestead would dig a pit and install a slab and then not complete the superstructure. One Community Development Officer (CDO) found that an effective solution to uncompleted superstructures was to bring the construction materials for the water system to the community, telling the community that construction would begin as soon as the latrines were completed. Apparently, assuring the community that the water system was imminent moti-

[11] A latrine is considered complete when the pit, slab, pipe, and superstructure are in place.

vated them to complete the latrines. This is not surprising, given frequent delays of as much as five years from some communities' initial requests for water to final system completion.

In the communities we visited with operating project water supply systems, the pit latrines seemed to be relatively well-constructed to the MOH design[12] and were said by community members to be used routinely by all members of the homestead. Some people said they had latrines before they initiated the request for water; others said it was the project that educated them to see the importance of latrine usage. An important impact of the required linkage of water and sanitation that occurred in this project was an ultimate demonstration of the benefits of water and sanitation. Once the community could see first hand the benefits of clean water and sanitation, it appears they were more committed to completing, using, and maintaining the latrines.

Communities are actively involved in their own latrine construction, although on more of a homestead (individual) than a community basis. The homestead supplies E10 (US$4) for the system; E5 for the pipe and E5 for the slab. The homestead digs the pit. Concrete slabs are generally cast on site with community assistance under the technical supervision of the CDO and the HA. The homestead, as mentioned above, is responsible for erecting the superstructure.

The latrines we saw at project sites generally met accepted standards for a ventilated pit latrine, but some were missing the screen on top of the pipe. We were told this was because the materials had not been delivered. As we observed in the field and was confirmed by CDOs, most homesteads construct a double-sized pit and locate two separate compartments over the pit.[13] Homesteads may be segregating themselves by sex or age (there was no concurrence on this point), but both the compartments appear to be used. We also observed most pit latrines had seats at the choice and expense of the owner. Allowing this kind of flexibility in design to respond to individual preferences is important to ensure usage.

One impact of the project was to improve upon the traditional unventilated pit latrine. Most people who were unhappy with their old latrines (and less likely to use them) cited leaking roofs, walls, and odors as the reason (Green, 1982). While there is no empirical data on this point, our field observations and interviews suggest that properly constructed VIP latrines did not leak or have odors and that people used and liked them as intended.

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[12] In response to a 1988 evaluation recommendation, the MOH established standardized criteria for pit placement and sizing, slab design, and ventilation pipe and fly screen specifications.

[13] It was explained to us that it is easier to dig down three meters if the pit measures 90 x 180 cm. rather than 90 x 90 cm.

NGOs also note the impact of the RWBDC project focus on sanitation. For instance, the leader of the Traditional Healers Organization said that by working with the MOH on the project, many traditional healers in Swaziland were educated on the need for community sanitation. As a result, traditional healers have, in turn, educated rural dwellers to the link between health and sanitation and helped with training in how to build latrines. This effort has led to the construction of approximately 1,700 latrines.

These combined efforts in sanitation have resulted in improved coverage of rural communities. In 1976, it was estimated that 16 percent of rural Swaziland homesteads had pit latrines, serving a population of 63,000 individuals. The 1990 estimates indicate 40 to 45 percent rural coverage, or 250,000 individuals.

In summary, although the technology is simple, creating a demand for sanitation is not. Project experience has shown that sanitation initiatives proceed at a slower pace than water supply. This is partly because beneficiaries do not perceive the benefits as clearly. Even when there is clear demand, it can take a long time to achieve a high level of coverage due to continuing shortages in transportation and staff that affect MOH capacity.

2.2.3 Water Access

In terms of directly observable impact on beneficiaries, the most significant result of the RWBDC was to provide public access to safe drinking water.

We attempted to count these beneficiaries by extracting data from the Project Initiation Reports prepared for each system as a USAID requirement. These reports provide a rough count of population served among other relevant site information. There was no evidence that either the RWSB or USAID had previously attempted to aggregate these data for management or monitoring purposes. Appendix E contains our summary of selected information on each project, drawn from the initiation reports and other sources.

From these data we can conclude that upwards of 50,000 people (approximately 9 percent of the rural population of Swaziland) have obtained improved access to safe water as a result of 76 systems providing over 525 public standpipes supported by the RWBDC project.

The rural water systems provided under the RWBDC project were designed to provide three benefits: an increase in the quantity of available water, an improvement in water quality, and easier access to water. There is, of course, considerable overlap in these benefits since easier access to a piped system encourages people to use more and safer water.

The RWSB uses a basis of 30 liters per person per day from an uncontaminated and protected source in designing the systems that it installs. Appendix E data suggests that flow

from the USAID-supported systems ranges from 20 to 60 liters per person per day[14]. Research in rural Swaziland suggests that normal usage in the absence of a piped system is 10 liters per day. Water access in the absence of a piped system varies widely but many rural Swazi women spend hours a day fetching water from streams and springs some distance from their homesteads. By available evidence, the systems built under the RWBDC project generally deliver more water, safer water, and with more convenience (reducing the risk of contamination in transit) to most residents of participating communities. These systems do so at a modest capital cost averaging E76 (US$30) per capita.

The typical RWSB system moves water in buried pipe from a protected source to a series of standpipes and taps strung out along the breadth of a community. Systems may involve from one to as many as 30 or more taps, depending on the size of the community and nature of the source. As a guideline, the RWSB attempts to place a public standpipe within 200 meters of each user.

In addition to the potential health benefits discussed below, improved water access results in obvious time savings to rural families, especially women. No one has tried to quantify these benefits in Swaziland[15] but it was suggested from our community visits that the saved time is productively utilized, in some cases in more attention to household tasks and child care and in some few cases through income generating activities such as sewing, poultry raising, or gardening. In the absence of piped systems, Swazi women must walk up to 5 km to a water source, then often wait at the collection point. For some, this consumes a large portion of the working day.

2.3 Community Impact

2.3.1 Community Organization and Development

A major lesson learned during the International Drinking Water Supply and Sanitation Decade (1981-1990) was that many problems experienced in rural water supply programs are not primarily of a technical nature. As in much of the developing world, many water

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[14] There are six exceptions to this range, three lower and three higher. The lowest measured flow in a project-supported RWSB system is 11 liters per person per day; the highest is 460.

[15] A hypothetical analysis was provided in the Economic and Financial Analysis Annex to the RWBDC PP Amendment. Here it was noted that a homestead of 10 people each using 10 liters per day would require the carrying of five 20-liter water containers. At between 20 and 30 minutes per trip, closer sources of water would save two hours or more per day per homestead. At an assumed time value of E2 per day (the casual labor wage rate), the savings in labor time fetching water is E180 (US$72) per year, which is itself more than the per capita capital cost of typical system construction.

systems in rural Swaziland have failed or have not achieved their full potential because communities were not involved in system planning or did not understand the importance of clean water. RWSB experience indicates that involving community beneficiaries in all phases of the water supply and sanitation system – planning, design, construction, operation, and maintenance – leads to a sense of ownership critical for the sustainability of the system. In addition, training which develops community skills in financial management and system operation and maintenance are essential if water systems are to be sustained after construction.

Consistent with these lessons, the extension of the RWBDC Project supported the RWSB and MOH in their emphasis on community participation and has allowed for the development of the concept into reality. Since community participation is heavily influenced by factors such as culture and tradition, an understanding of Swazi community organization is important.

Swaziland does not have villages in the usual sense of the word. A community in Swaziland is defined as a cluster of dispersed homesteads that fall under the undisputed authority of a chief. These communities are named, have a degree of internal organization, and have boundaries. Roughly 50-75 homesteads constitute an average community with an average of 8-10 persons per homestead. Formal leadership consists of Chiefs, who usually are chosen by heredity. Decision-making tends to be top-down with Chiefs wielding a great deal of power, at least if they choose to exercise it.

Community decision-making often begins at weekly meetings held by the Chief with his Council. Council members usually are elderly men; women may attend but are not allowed to participate. Issues that require special attention are addressed by forming committees. A project-funded study of Swazi community organization (Green, 1984) found that all Swaziland communities had committees dealing with development-related activities. Therefore, the use of a committee to involve the community in a development project such as water supply and sanitation builds on existing Swazi custom.

The RWBDC Project has developed procedures to involve the community in all aspects of the rural water supply system in a community. Requests for water supply and sanitation systems typically begin within the Chief's council meetings. Many of the Chiefs have been educated through rural development training seminars about the importance of clean water and sanitation for health. The community also may have been exposed to the idea of water supply and sanitation through health education programs.

Once a community Council has decided that water is a priority, a delegate is sent to the district RWSB office to indicate that interest. The RWSB Community Development Officer (CDO) then travels to the community and holds a meeting to identify what the community is looking for and to explain the requirements of the RWSB. The community needs to meet six major requirements in order to qualify for assistance. The requirements were established,

based on experience, as those necessary to enlist community participation and to ensure sustainability.

1. The community must establish a Water and Sanitation Committee to manage and maintain the system. In the early years of the RWBDCP, most Water and Sanitation Committees dissolved after system construction. With the increased emphasis on community management of systems and funds in the project extension, these committees have assumed an ongoing role within their communities and meet regularly to deal with system operation and maintenance issues.

2. The Water and Sanitation Committee must establish a maintenance fund with which to generate the system. This usually includes the collection of E1,000 (US $400) in earnest money plus a small monthly user fee from each homestead.

3. The community must have been resettled according to the guidelines set forth by the Rural Development Agency of the Ministry of Agriculture and Cooperatives. Resettlement is a process whereby the homesteads in a community are moved closer together while the land associated with that community remains the same. RWSB experience has shown that communities are less apt to invest in or maintain systems when they do not have a long-term commitment to stay in one place. Indeed, of the water supply systems the team visited, the one handpump site (not a RWBDCP project) which was littered with solid and human waste was in an area with a highly transient population where there was no Water and Sanitation Committee.

4. The community must provide unskilled labor for the construction of the systems. Interestingly, community members seem to value this type of participation highly. In one meeting we held with a water committee, members responded enthusiastically when asked if they had volunteered labor. As one woman replied, "We found it was important to participate because if someone does something for you, you don't care about it."

5. The community must select at least two water minders to operate and maintain the system. The RWSB trains the water minders both at the maintenance depot and on site to do routine maintenance tasks. It is the community's responsibility to handle compensation (if any) to these people. In at least one community the maintenance people were given a direct water line to their home in payment for their services. If they don't perform as expected, the line may be removed.

6. Finally, the community must construct pit-latrines to serve the homesteads in the area receiving assistance.[16]

Upon meeting at least the first five of these six requirements, the Water and Sanitation Committee meets again with the RWSB. A Community Readiness Survey is prepared by the committee and submitted to the RWSB. The survey ascertains that all the RWSB requirements are met. It is also used to determine the existing level of organization within the community, the community's development priorities, community health concerns, and hygiene practices. This information assists the RWSB and MOH in determining the interventions necessary to enlist community participation.

The next step is the preliminary design of the proposed system. The community also is involved as much as possible in this process. During community meetings, the RWSB explains costs of feasible schemes and guides the community in the choice of a system which is both technically manageable on a local level and affordable. When the community chooses more expensive options, such as individual homestead connections, the RWSB guides them in estimating additional costs.

At this point a request for funding is submitted to relevant donor agencies for consideration. Securing funding and proceeding with construction often has been a lengthy process, averaging five years for RWSB. Throughout this period, community meetings continue to be held; health education efforts are carried out; and pit latrines are constructed.

With strong support and encouragement since 1986 from the RWBDCP, the RWSB has evolved its concept of community participation to include not only decision-making and resource contributions, but also responsibility for ownership of the system. All these aspects were apparent in our site visits. A brief synopsis of one meeting is illustrative of the potential that can be harnessed when a well-functioning Water and Sanitation Committee works cooperatively with the RWSB and MOH.

The team met with two Water and Sanitation Committee members, the Secretary and Vice-chair (both women), in Endzingeni. This community has a year-old spring gravity-fed system with 16 standpipes serving a population of 1,600. The women said that in 1983 the CDO came to their village and explained that the polluted water they were using for domestic

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[16] The coordination of pit latrine and water supply construction has been problematic throughout the project. Several factors contribute to this situation. First, the community may not perceive sanitation to be important and thus consider pit-latrine construction an imposition. Second, the GOS institutional arrangement which places rural sanitation and water supply in different ministries, MOH and MNRLUE, respectively, is not conducive to joint interventions. The RWSB and the MOH-Health Inspectorate are aware of these problems but coordination has slowed since the end of the RWBDCP. Meanwhile, one concession to the real situation has been to reduce the requirement for latrine coverage from 100 percent to 50-60 percent before the water supply construction begins (or ends, for that matter).

purposes was not good for them. The water source was a spring-fed stream which the people shared with the cattle. Education efforts continued and, in 1985, a community delegate went to the RWSB to ask for help in building a water supply system. This community had also been educated regarding sanitation and was active building latrines in 1983-85.

The RWSB asked the community to start a Water and Sanitation Committee and to raise money. A general meeting with the Chief was called and many meetings followed. Finally, the community voted on a Committee composed of six women and three men. The Chief supported the effort and set an example of participation (although he does not live in the community) by contributing the required homestead fee, E20 (US$8). The committee endeavored to collect E20 (US$8) from each homestead and was successful in raising a sum of E700 (US$280). Although short of the RWSB required E1000 (US$400) this fund was sufficient to demonstrate their motivation to the RWSB.

Meetings then were held in the community to plan for design. The community volunteered labor in clearing bush and digging trenches. Construction began in 1987 and was finished in 1988. An official ceremony was held emphasizing that now the community is accountable for operations and maintenance. Two volunteers were chosen as water minders and the CDO took them to training to learn how to handle records and to perform routine maintenance. Training was also given in managing the water fund. Currently, the water supply system is operational and no maintenance problems were noted. The Water and Sanitation Committee continues to meet monthly and is working on getting individual taps to their homesteads. The Chair of the committee noted "this was the first project where we (the community) came together." When asked what they learned from working as a committee, the reply was, "We realized when we came together we formed a better team." Now this community is organizing itself to have a clinic and a community garden.

The high level of women's involvement in community development illustrated above is typical of rural Swaziland. Women have key responsibilities in community management because most able-bodied men go elsewhere for employment and thus are absent for long periods of time. Women's associations, found in most communities, have proven to be among the more effective and sustainable of community committees (Green, 1984). Therefore, it is not surprising that the RWBDCP regarded women's participation as essential to the success of community organization and development activities. Women form the majority of most Water and Sanitation Committees, hold key positions, and manage the money in the operations fund. Women are consulted in assessing the needs of the community in water and sanitation, in identifying water sources, and in siting stand pipes. Once construction begins, women provide the majority of the volunteer labor for both water and sanitation. The convenience and time-savings that result from a water supply system were well-recognized by women in the communities covered by the RWBDCP and serve as a tangible reward and reinforcement for their participation.

The impact of community participation on the sustainability of water supply and sanitation projects in Swaziland is yet to be fully realized since the water supply systems are relatively new. However, other significant impacts of the project emphasis on community participation are readily apparent. One result of increased quantity and accessibility of water is that communities can make cement bricks on site and many communities are using the bricks to build "better" houses. One community we visited was building a new school with bricks produced in their community. Another benefit to a community from active participation in the development and management of its water system is that the community expertise and confidence can be applied to other development efforts. We observed this effect of community empowerment in most sites visited. Communities reported organizing to build roads, bridges,and schools.

In summary, the RWBDCP extension supported ongoing efforts within the RWSB to enhance community participation in water and sanitation projects. By demonstrating the feasibility and success of this approach in terms of building sustainable water and sanitation systems and fostering further community development efforts, the RWSB has led the way for others in the field.

2.3.2 Water System Management and Maintenance

During the life of the RWBDC project, and particularly since 1986, there have been significant changes in the way in which rural water systems in Swaziland are managed and maintained. Of most significance is a shift of responsibility to the community, coupled with direct efforts to mobilize community involvement and train community members in necessary management and maintenance skills.

As described above, the RWSB has established an approach to fostering community involvement, starting with a readiness survey and carrying through to the community's involvement in the construction of their water system and its operation and maintenance. In part the passing on of certain costs and obligations to the community was necessitated by the RWSB's own limited budget and staff resources. More broadly, however, there seems to be general commitment to the concept of community "ownership" of their water systems as a necessary (if not sufficient) condition for continued operation and maintenance.

In addition to their role in making requests for new systems to the RWSB, local community water committees organize local labor for pipe-trenching and must raise E1000 (US$400) to seed an operation and maintenance account. In most cases, monthly user fees of E2-3 ($.80-1.20) are raised from each homestead, especially in cases where a diesel or electric pump is used. Higher fees are levied in cases where private homestead taps are provided. The intent of these funds is to finance future maintenance or replacement parts costs. In communities we visited, the amount saved ranged from a few thousand Emalengeni up to as much as E10,000 ($4000). In some cases, funds are used also to pay a stipend to a

"water minder" who monitors system use and repair. Water minders (preferably two to four in each community) receive on-site training in simple system maintenance from the RWSB.

Most of the systems funded under the RWBDC project are too new to have experienced many maintenance problems to date. We did observe, however, that virtually all of the communities we visited had accumulated enough money in their operations fund to finance any predictable maintenance problems. In addition, all of the systems were working.

In 1989 the RWSB decentralized its central maintenance unit to depots in each of Swaziland's four Districts as a means of reducing travel and time costs to reach rural systems. There also are efficiencies associated with combining construction and maintenance staff and facilities at the District level. Only major system maintenance now is handled by the Chief of Works for maintenance at the central headquarters in Mbabane. It has proven difficult, however, to recruit the specialized and skilled manpower necessary to staff the decentralized units. It also is necessary to provide more vehicles and equipment, a difficult challenge for the RWSB's limited budget.

The community's obligation in the process is to monitor the status of their system. In theory, information regarding operating status, water production, fuel or electricity consumption, etc. is recorded by the community and reviewed periodically by RWSB maintenance staff. In 1987, a short-term RWBDC project consultant provided the RWSB an "evaluation plan" consisting of 29 forms and instructions for their use. Eight of these forms deal directly with system operation and maintenance, one of which was to be filled-out by the community, the rest at various levels of the RWSB. Not surprisingly, none of these forms is being used; in our opinion, their complexity is out of proportion to both essential information needs and the administrative resources available to the RWSB.

RWSB maintenance performance remains uneven; there is almost no preventive maintenance, which adds to the importance of training locally-designated community members in maintenance skills. There is no regularized system for checking rural water systems from the RWSB's regional depots, in part for lack of vehicles. There are no mobile teams as such; maintenance support to communities from the RWSB thus remains reactive and slow. RWSB depots are not well-stocked with spare parts, except for pipe fittings and taps. It is assumed that communities can buy pipe when needed and that pump repair or other services beyond local technical capacity will be hired privately.[17]

The unrepaired failure rate of water systems that the RWSB built prior to 1986, when communities had no responsibility for funding maintenance, appears to be much higher than for the newer systems, even allowing for their age. Given the limited capacity of the RWSB to finance or provide maintenance, communities that have not established the organizational,

[17] With the knowledge and approval of the RWSB, their own technical staff are available to provide paid maintenance services on a "moonlighting" basis.

financial, and technical capacity to solve their own system problems often watch their broken systems sit unrepaired indefinitely. In some cases this has happened even where there were simply problems like a burst pipe.

The RWSB, in collaboration with the MOH Health Inspectorate, has conducted a series of rural community training seminars to be held several times each year. Among the topics covered in these comprehensive seminars are the need for and uses of a maintenance fund, operations and maintenance procedures, and accounting. Instructors include the RWSB planning engineer and district assistant community development officers. These courses are a well-designed reflection of RWSB awareness that additional community training in system management and maintenance is necessary if communities are to fulfill their expected major role in keeping their own systems operational.[18]

Movement from the centralized construction of water systems with no local involvement to the current emphasis on local organization, training, and financial commitment was given major impetus by the RWBDC project. With some variation, the scheme developed for the USAID-funded systems has been applied to systems now funded by other donors. For example, in contrast to water systems they supported prior to 1986, a current European Economic Community project with the RWSB requires advance community organization and an up-front local funding commitment although system construction (including labor) is contracted out. RWSB staff indicate that training for communities in how to operate and maintain water systems as well as collect and account for funds now is a part of all funding proposals to donors.

[18] These seminars also cover health and sanitation topics and utilize instructors from the MOH Health Inspectorate. They represent the most visible evidence of effective MOH-RWSB collaboration in the time subsequent to the end of the RWBDC project and the departure of the Public Health Engineering Advisor. Though the costs of these seminars have been underwritten by the WHO and EEC, their planning and implementation have been carried out by Swazi officials.

Chapter 3

LESSONS LEARNED

From this analysis of RWBDC project impacts, we have attempted to draw out certain lessons learned that may be of value to readers of this evaluation. Because the RWBDC project has ended, these lessons must be directed to planners and implementors of other projects, both in Swaziland and elsewhere. We have divided these lessons into three categories: points that we believe may be of primary value to the Government of Swaziland; items of interest to USAID; and lessons drawn from the extensive technical assistance experience of the project. Some lessons, of course, have application beyond a single category or to development activities other than water supply and sanitation.

3.1 Government of Swaziland

1. Community organization pays off, particularly when money and effort must be invested. Sustainable water and sanitation services depend on consumer demand as reflected in willingness to make a commitment of time and financial resources.

2. Involving the community in decision-making, provision of resources (labor, money), and operation and maintenance support creates a sense of system ownership that contributes to sustainability.

3. Local water and sanitation committees are more effective and sustainable if they have an ongoing responsibility for collecting and managing funds for their constituents.

4. Community motivation to build latrines is increased when latrine construction is a prerequisite for the start-up of water supply systems.

5. When water and sanitation agencies expand their perception of their role beyond construction of physical works to include provision of a service to people, agency coordination is facilitated and there is greater openness to meaningful community participation.

6. The effort to coordinate an operational function like water supply with multiple health approaches such as education, sanitation, and disease monitoring should be centered in the Ministry of Health The MOH also is the agency with primary interest in health outcomes.

7. Community expertise and confidence, established through participation in water and sanitation projects, can reinforce other community development activities.

3.2 USAID

1. Appropriate community-based water and sanitation improvements, when combined with supportive public health education and services, have the potential to bring benefits to a significant number of people at relatively low cost.

2. Fixed amount reimbursement can work against project goals of flexibility, sustainability, and effective planning. Fixed amount reimbursement rigidity is inconsistent with seasonality of labor availability, inflation or currency fluctuations, and the overriding importance of building local capacity rather than driving toward fixed time targets for completion of physical activities or expenditure of funds.

3. USAID bears some responsibility for assuring that technical assistance serves institutional development goals. The process of skill transfer and the appropriateness of TA inputs from expensive external sources need to be carefully planned and monitored. This is especially true when long-term TA is provided through a personal services contract and short-term TA through unrelated contracting mechanisms.

4. Project designers should identify usable, management-oriented indicators to guide both project implementors and evaluators in measuring progress against objectives. Although it started well, the RWBDCP, like many projects, left almost no relevant or consistent trail of documented information about its impacts, despite a considerable history of consultant-generated reports.

5. If the impact of a project is to be measured at all accurately, care must be taken to ensure that indicator measures before and after are comparable. If the project must collect its own baseline and end-of-project data, the method used should usually be the same, even if a "superior" method is proposed for the final evaluation.

6. A project with a long-term objective to change people's behavior has a responsibility to be patient. The length of the RWBDCP offered a real opportunity to work to change behavior that puts people at risk of schistosomiasis. That opportunity was lost when the project turned to the more immediately satisfying option of construction of water systems and latrines.

3.3 Technical Assistance

1. When technical assistance advisers act in a "performer" or "substitute" mode, transfer of capability is constrained and sustainability threatened.

2. The priority of a long-term adviser in the final phase of his or her time in the field should be to establish local institutional mechanisms and capacity and to phase out direct implementation and coordination roles.

3. When primary "ownership" of short-term technical assistance is external, as is a potential with TA provided by a centrally-funded AID project with its own agendas, there is a strong risk that the studies will not be used by local actors.

4. When the role of a technical advisor is much broader than that of the counterpart who is expected to replace him or her, the chances of successful replacement and sustainability are diminished.

Chapter 4

CONCLUSION

The most visible accomplishment of the Rural Water Borne Disease Control project was to provide clean piped water to some 50,000 rural Swazis. Associated sanitation (latrine) coverage was less extensive but still significant. In connection with the construction of local water supply systems and latrines, Government of Swaziland staff from the Ministry of Health and the Rural Water Supply Board reached a significant proportion of the rural population with health-related messages that were heard and understood. These GOS agencies, however, have not measured the extent of change in health behavior among beneficiaries, nor have they collected data to permit such measurement.

Training, technical support, and technical assistance all enabled counterpart agencies to perform more effectively during the life of the project. The Rural Water Supply Board became impressively productive. The Bilharzia Control Unit was reinforced, and the Health Education Unit gained credibility and a place within the MOH, thanks largely to the project. A significant unanticipated result that greatly extended the reach of health education in Swaziland was the forging of links between the MOH and the traditional healers.

Support to local organization and participation was a major indirect benefit from community water and sanitation interventions. The project facilitated the formation and continuing effectiveness of Water and Sanitation Committees in most project-supported communities, demonstrating the utility of a common financial commitment to maintain community involvement.

The nearly 10 years of the project had more uneven impact on institutional capabilities, coordination, and sector development in the Swazi agencies involved with the RWBDCP. The development of a public health perspective within the RWSB has not been sustained. Some of the short-term TA, especially in the latter years of the project, was poorly matched to local needs and absorptive capacity The long-term public health engineer achieved a personal coordinating role that has been conspicuously lacking since his departure. The level of continuing interagency coordination at the center is tenuous, and the sectoral planning process has stalled. Still, at the field level, informal coordination between MOH and RWSB personnel remains strong, in part as a result of the emphasis on the linkage of water and sanitation fostered by the project.

Several RWBDC initiatives such as health communication and community development paved the way for effective GOS-USAID collaboration under other project umbrellas.

Measured against the stated project purposes and, especially, the planned outputs of the first seven years and then those of the three-year extension, the RWBDC is a qualified success. Above all, it helped deliver a major health and quality of life benefit, safe water, to a significant number of rural Swazis. This benefit promises to have lasting impact.

Appendix A

Persons Contacted

The following persons generously shared insights and information with the evaluation team.

Organization
Location
Person — Position

USAID/Swaziland
Mbabane:

Anita Henwood	Assistant Health Dev. Officer
Jay Anderson	Regional Health Dev. Officer
Roger Carlson	Mission Director
Mary Huntington	Deputy Mission director

Ministry of Natural Resources, Land Use, and Energy
Mbabane:

Sandile B. Ceko	Principal Secretary
Ambrose N.N. Maseko	Under Secretary

Rural Water Supply Board
Mbabane:

Napoleon Ntezinde	Senior Engineer
Melvin Mayisela	Planning and Construction Engineer
Isaac Ngwenya	Design Engineer
Cyril Kanya	Clerk of Works/Maintenance
Nicholas Ginenza	Community Development Officer

Matsapha:

Zanele Sigwane	Lab. Technologist, Water Qual. Lab
Meshack Dlamini	Lab. Technician
Emmanuel Nkomo	Maintenance Storeman
Elphus Ndzimandze	Maintenance Technician

Manzini Region (Manzini):

Emmanuel Lukhele	Clerk of Works
Elijah Sikhondze	Comm. Dev. Officer

Lubombo Region (Siketi):

Henry Zikalala	Comm. Dev. Officer

Shiselweni Region (Nhlangano):

Philip Mamba	Clerk of Works
Dance Mngomezulu	Comm. Dev. Officer

Ministry of Health

Bilharzia Control Unit

Manzini:

Sibongile Mthupha	Program Manager

Health Inspectorate

Mbabane:

Leslie Mtetwa	Senior Public Health Inspector
Richard Mamba	Dep. Sr. Public Health Inspector
Dudu Dube	Public Health Inspector
Poppy Dlamini	Public Health Inspector

Siteki:

Gcina Dlamini	Public Health Inspector

Piggs Peak:

Precious Dlamini	Public Health Inspector

Health Education Unit

Mbabane:

Pitnera Mthembu	Senior Health Education Officer
Lombuso Nxumalo	Nutritionist, Health Education Unit

Medical Statistics

Mbabane:

Ernest Mnisi	Statistical Clerk

Primary Health Care Project (USAID)

Mbabane:

Daniel Kraushaar	Chief of Party
Vincent Joret	MCH Physician

CCCD Project (USAID)

Mbabane:

Larry Brown	Technical Officer

Council of Swaziland Churches

Manzini:

Thembe Nkambule	Water System Technician
Jacos Hlope	Community Development Officer

European Economic Community (EEC)

Mbabane:

Jose Pinto Teixeira	Technical Adviser
Celal Alpman	Technical Adviser

Emanti Esive ("Water for the Community")

Manzini:

Bob Needham	Engineer
Khanyisile Dlamini	Health Education Officer

Mbabane:

David Taylor	(now with Skillshare Africa)

Water System Communities visited:

Nkwene:

Irene Nene	Nurse in Charge, Nkwene Clinic

Endzingeni:

Mewriter Mkonta	Vice-chairperson, Water Committee
Malta Simelane	Secretary, Water Committee

Mahlabatsini:

Pindi Mdluli	Water system user

Mbekelweni:

12 members	Water Committee

Other:

Mbabane:

Edward C. Green	Anthropologist (original project team member)
Stanley O. Foster	CDC Atlanta (CCCD Project)
Mary Pat Selvaggio	USAID/Maputo (former AHDO/Mbabane)

Washington, DC:

Alan Foose	Former RHDO, USAID/Mbabane
Craig Hafner	WASH Project
Dennis Long	AID/W Office of Health
Philip Roarke	WASH Project
A.W. Hoadley	Former Long-Term Adviser, RWBDCP
John Lawrence	Former Short-Term Adviser, RWBDCP

Appendix B

References

The references below represent documents directly related to the RWBDC project or documents addressing relevant technologies, evaluation methodologies, or other topics of use to the evaluation team. References are divided by category.

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Appendix C

Field Sites Visited

Manzini Region:	Dwaleni
	Mbekelweni
	RWSB Water Quality Laboratory (Matsapha)
	RWSB Construction Depot (Matsapha)
	MOH Bilharzia Control Unit (Manzini)
	MOH District Health Office (Manzini)
	Emanti Esive Headquarters Office (Manzini)
	Council of Churches Headquarters Office (Manzini)
Shiselweni Region:	Endzingeni
	Nkwene
	Mahlabatsini
	Etibondzeni (Emanti Esive)
	RWSB District Office (Nhlangano)
Hhohho Region:	MOH District Office (Piggs Peak)
Lubombo Region:	MOH District Office (Siteki)
	RWSB District Office (Siteki)
	Traditional Healers Organization Headquarters Office (Siteki)

Appendix D

Interview and Site Investigation Issues

Agency Interview Issues

1. The impact of the project. What did it do? What made it different?

2. What factors aided or impeded project success?

3. How did the project build staff and organizational capacity (via training and TA)?

4. What were the spin-off benefits to other activities?

5. What benefits are proving sustainable? Are human and financial resources in place to continue key activities?

6. How has institutional capacity increased in key GOS agencies (RWSB, MOH) as demonstrated by improved sectoral planning, coordination, water and sanitation system management and maintenance procedures, and health education delivery?

7. Has there been any private sector subcontracting?

8. What is status of systems planned and systems completed?

Site Investigation Issues

1. Number of homesteads and population of community

2. Number of latrines built in community

3. Population served by water systems

4. Previous water access

5. Quantity of water available through new system

6. Technology employed for water supply and latrines

7. Maintenance history

8. Level of Community Infrastructure

9. Disease Prevalence

10. Clinic Access

11. Health personnel in area

12. Health inspector visits

13. Health practices: water storage, latrine use, use of ORT, bathing practices

14. Community organization (development committee) records - financial, maintenance, meetings, etc.

15. Community spin-off effects

16. Time savings achieved

The team should try to make contact with a representative of the local community organization.

Site information should be supplemented by water quality, cost, and other date available from central or regional offices of the RWSB and MOH.

Appendix E

Summary of Water Supply Projects Completed by the Swaziland RWBDC Project

DISTRICT	ZONE	POP. SERVED	TYPE OF PROJECT	Km. PIPE	STAND PIPES	FLOW l/sec	l/pers /day	FINISH DATE	EST. COST
Community RWSB Projects									
MANZINI DISTRICT									
Dwaleni	MV	750	Sp. Gr.	2.6	9	0.35	20.2	7/88	52,000
Bhodo	MV	2115	BH EP	13	15	2.90	59.2	9/89	196,500
Ntondozi	MV	100	Sp. HP	0	1	0.13	56.2	7/88	5,500
Mzimbili	MV	336	Sp. Tap	0	1	0.16	20.6	7/88	4,300
Mahlanya	MV	200	Sp. Tap	0	1	0.24	51.8	12/88	5,500
Esitjeni	MV	1850	BH EP	8.9	32	1.10	25.7	9/89	157,300
Emgofelweni(1)	HV	200	Sp. Gr.	1.2	3	0.20	43.2	5/89	13,000
Emgofelweni(2)	HV	500	Sp. Gr.	1.6	6	0.33	28.5	5/89	20,200
Emgofelweni(3)	HV	300	Sp. Gr.	1.4	4	0.08	11.5	5/89	14,000
Boyane	MV	2900	BH EP	11.4	35	2.70	40.2	***	160,400
Enkanjini	MV	884	Sp. Gr.	3.7	12	0.25	12.2	9/89	90,000
Logoba	MV	N/A	BH HP	0	1	N/A	N/A	9/89	N/A
Joy Mission	MV	N/A	BH HP	0	1	N/A	N/A	9/89	N/A
Mbekelweni	MV	2633	BH EP	9.8	23 +30 private	2.30	37.7	86	137,400
District Total		12,768		54	144 +30 private			(E67 per capita)	856,100

DISTRICT	ZONE	POP. SERVED	TYPE OF PROJECT	Km. PIPE	STAND PIPES	FLOW l/sec	l/pers /day	FINISH DATE	EST. COST
SHISELWENI DISTRICT									
Endzingeni	MV	1600	Sp. Gr.	7.2	17	0.53	14.3	5/88	110,600
Nkungwini	MV	1930	Sp. Gr.	11.5	33	0.90	20.1	9/89	181,100
Nkwene	MV	1836	St. Gr.F	8.5	26	1.50	35.3	***	248,700
Masibini	HV	425	BH HP	0	1	1.70	172.8	9/89	8,600
Community									
Emahlabeni	HV	225	BH HP	0	1	N/A	N/A	9/89	8,600
Thunzini	HV	225	BH HP	0	1	2.40	460.8	9/89	8,600
Madulini	MV	N/A	Sp. Gr.	N/A	N/A	N/A	N/A	86	
District Total		6,241		27	79				566,200 (E91 per capita)

DISTRICT	ZONE	POP. SERVED	TYPE OF PROJECT	Km. PIPE	STAND PIPES	FLOW l/sec	l/pers /day	FINISH DATE	EST. COST
Community									
LUBOMBO DISTRICT									
Ngcina	LV	2290	BH EP	15.6	31	1.50	28.3	11/88	284,000
Kashoba(1)	LV	300	BH HP	0	1	0.75	108.0	5/88	7,800
Kashoba(2)	LV	300	BH HP	0	1	0.65	93.6	5/88	7,800
Kashoba(3)	LV	300	BH HP	0	1	0.75	108.0	5/88	7,800
Kashoba(4)	LV	300	BH HP	0	1	0.27	38.9	5/88	7,800
Kashoba(5)	LV	300	BH HP	0	1	0.15	21.6	5/88	7,800
Scatfulo	MV	1200	Sp. Gr.	0.2	4	1.00	36.0	7/88	17,400
Manzini	MV	790	Sp. Tap	0	2	1.10	60.2	9/88	N/A
Mafucula(1)	LV	250	BH HP	0	1	0.60	103.7	7/89	9,200
Mafucula(2)	LV	200	BH HP	0	1	0.70	151.2	7/89	9,200
Mafucula(3)	LV	200	BH HP	0	1	0.40	86.4	7/89	9,200
Mphosi	MV	2400	BH EP	11.8	24	6.00	108.0	9/89	212,400
Tsambokhulu	MV	423	Sp. Tap	0	2	0.80	81.7	11/88	19,600
Ponjwane	MV	1523	BH EP	4.9	14	1.25	35.5	9/89	78,800
Katfwala	MV	400	BH HP	0	1	3.00	324.0	6/89	10,855
Vikizijula	MV	400	BH HP	0	1	0.25	27.0	6/89	10,855
Nkhonga	MV	1000	BH EP	3.8	11	1.50	64.8	***	110,900
Mphundle	LV	1974	Sp. EP	11.6	25	2.00	43.8	86	73,204
Duze	LV	N/A	BH EP	2	8	N/A	N/A	86	N/A
Emthongeni	MV	N/A	Sp. Tap	0	1	N/A	N/A	86	N/A
Embongolweni	MV	N/A	Sp. Tap	0	1	N/A	N/A	86	N/A
Entandweni	LV	N/A	BH HP	0	1	N/A	N/A	86	N/A
District Total		14,550		50	134				884,614 (E64 per capita)

DISTRICT	ZONE	POP. SERVED	TYPE OF PROJECT	Km. PIPE	STAND PIPES	FLOW l/sec	l/pers /day	FINISH DATE	EST. COST
Community									
HHOHHO DISTRICT									
Matfuntini	MV	2200	St. Gr.F	6.6	18	5.00	98.2	6/89	181,000
Klilwane	MV	1780	St. Gr.F	7.5	23	5.00	121.3	9/89	172,600
Emguleni(1)	HV	240	Sp. Tap	0	1	0.28	50.4	9/89	6,600
Emguleni(2)	HV	200	Sp. Tap	0	1	0.28	60.5	9/89	4,685
Ntabinezimpisi	LV	2830	BH EP	12.4	28	1.10	16.8	9/89	248,300
Mpompoza	HV	600	Sp. Gr.	3.7	12	0.40	28.8	6/89	51,000
Mshingishingini	LV	1780	BH HP	7.5	23	5.00	121.3	9/89	172,600
Mavula	LV	N/A	BH HP	0	1	N/A	N/A	9/89	N/A
Ntsinini	LV	420	BH HP	0	1	1.00	102.9	9/89	10,200
Motshane	HV	790	Sp. Gr.	4	11	0.40	21.9	86	51,200
District Total		10,840		42	119				898,185 (E83 per capita)
RWSB Total		44,399		172	476				3,205,099 (E76 per capita)

DISTRICT	ZONE	POP. SERVED	TYPE OF PROJECT	Km. PIPE	STAND PIPES	FLOW l/sec	l/pers /day	FINISH DATE	EST. COST
Emanti Esive Projects									
SHISELWENI DISTRICT									
Chibidze	HV	380	Sp. Gr.	1.7	5	0.10	11.4	N/A	24,000
Etibondzeni	MV	1015	Sp. Gr.	8	15	0.50	21.3	N/A	97,300
MANZINI DISTRICT									
Ensuka	MV	760	Sp. Gr.	4.2	13	0.25	14.2	N/A	48,300
Emanti Esive Total		2,155		14	33				169,600 (E79 per capita)
Council of Swaziland Churches Projects									
LUBOMBO DISTRICT									
Kalanga (1)	LV	150	BH HP	0	1	0.30	86.4	N/A	N/A
Kalanga (2)	LV	200	BH HP	0	1	0.40	86.4	N/A	N/A
Kalanga (3)	LV	100	BH HP	0	1	0.40	172.8	N/A	N/A
Kalanga (4)	LV	150	BH HP	0	1	0.40	115.2	N/A	N/A
Community									
Kandzangu(1)	LV	100	BH HP	0	1	0.24	103.7	8/88	N/A
Kandzangu(2)	LV	100	BH HP	0	1	0.33	142.6	8/88	N/A
Kandzangu(3)	LV	50	BH HP	0	1	0.70	604.8	8/88	N/A
Kandzangu(4)	LV	600	BH HP	0	1	2.45	176.4	8/88	N/A

DISTRICT	ZONE	POP. SERVED	TYPE OF PROJECT	Km. PIPE	STAND PIPES	FLOW l/sec	l/pers /day	FINISH DATE	EST. COST
SHISELWENI DISTRICT									
Nkoldolo A (1)	LV	400	BH HP	0	1	2.20	237.6	N/A	N/A
Nkoldolo A (2)	LV	350	BH HP	0	1	0.84	103.7	N/A	N/A
Nkoldolo A (3)	LV	400	BH HP	0	1	2.44	263.5	N/A	N/A
Nkoldolo A (4)	LV	400	BH HP	0	1	2.44	263.5	N/A	N/A
Nkondolo B (1)	LV	300	BH HP	0	1	2.10	302.4	N/A	N/A
Nkondolo B (2)	LV	350	BH HP	0	1	0.62	76.5	N/A	N/A
Nkondolo B (3)	LV	300	BH HP	0	1	0.12	17.3	N/A	N/A
Nkondolo B (4)	LV	350	BH HP	0	1	3.30	407.3	N/A	N/A
Nkondolo B (5)	LV	250	BH HP	0	1	4.40	760.3	N/A	N/A
Nkondolo B (6)	LV	300	BH HP	0	1	2.20	316.8	N/A	N/A
Matsenjeni (1)	LV	350	BH HP	0	1	0.6	74.1	N/A	N/A
Matsenjeni (2)	LV	300	BH HP	0	1	0.8	115.2	N/A	N/A
COSC Total		5,500		0	20				148,032 (E45 per capita)
PROJECT TOTAL		52,054		186	529				3,522,731 (E71 per capita)

NOTES

Key to Zone Codes
- HV = Highveld (3500-6500 feet)
- MV = Midleveld (1500-3500 feet)
- LV = Lowveld (600-1500 feet)

Key to Type of Project codes

Water Source	Water Flow
Sp. = Spring	Gr. = Gravity-Fed (F indicates filtration)
St. = Stream	EP = Electric Pump (may be diesel powered)
BH = Borehole	HP = Handpump
	Tap = pipe to single tap

Cost figures in Emalangeni (E1.00 = US$0.40)
*** = Projects competed after RWBDCP PACD and not reimbursed by USAID
N/A = information not available from RWSB or NGO files

Appendix F

Agenda for Traditional Healers' Conference

(Quoted from the Programme of the Traditional Primary Health Care Workshop held at Kanyamazane Hall, 13-14 September, 1990)

" TRADITIONAL PRIMARY HEALTH CARE "

On the importance of WHO - slogan - "Health for All by the Year 2000". The workshop is subsequent to a national indigenous health practitioners and the modern sectors cooperation which the Ministry of Health and Social Welfare has carried out with technical and financial assistance of THO, the Traditional Healers Organization for Africa. Regional seminar for traditional healers and the nurses. 12th - 14th September 1990, Kanyamazane Township Hall at Lekazi - ka Ngwane.

SEMINAR OBJECTIVES

The overall objective of the Seminar is to intensify the Remote Rural Rehabilitation Centres Mobilization and give basic orientation to Traditional Health Practitioners on Child Survival and Development with special emphasis on EPI and WHO slogan, "Health for All by the Year 2000."

Specifically the Seminar seeks:

1. To examine / review the current role of the Traditional Healers on Child Survival and Development.

2. To create awareness on Child Survival Development Programmes.

3. To examine / explore ways of linking the TraditionalHealers potential in the promotion of Child Survival and Development.

4. Upgrading the skills of THO WORKING FORCE (Field Officers, Consultants, Promoters, Master Healers and Mentors).

5. To orient the Traditional Healers with eight modules on Child Survival and Development.

6. To improve the cooperation between the Modern and the Traditional Sectors and help with the developing of referral systems between the Sectors.

The Environmental Health Project (EHP) provides technical assistance to USAID missions and bureaus and other development organizations in nine areas: tropical diseases, water and sanitation, wastewater, solid waste, air pollution, hazardous waste, food hygiene, occupational health, and injury. It is part of the Office of Health and Nutrition's response to requests from USAID missions and bureaus for an integrated approach to addressing environment-related health problems. In addition to EHP, this effort includes an Environmental Health Requirements Contract and a PASA (Participating Agency Support Agreement) with the U.S. Centers for Disease Control and Prevention. A wide range of expertise is made available by EHP through a consortium of specialized organizations (see list below). In addition to reports on its technical assistance, EHP publishes guidelines, concept papers, lessons learned documents, and capsule reports on topics of vital interest to the environmental health sector. For information on the reports available, contact EHP headquarters.

ENVIRONMENTAL HEALTH PROJECT